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HITACHI

MODEL V-211/V-212
V-222/V-422
OSCILLOSCOPE

SERVICE MANUAL

Hitachi Denshi, Ltd.

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"WARNING – THESE SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING OTHER THAN CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO."

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NOTICE

This Service Manual describes the most typical product of this model. If there are any specific differences between this Manual and the servicing unit, please contact Hitachi Denshi sales office in your area.

MODEL V-211/V-212/V-222/V-422

OSCILLOSCOPE

Service Manual

1. SPECIFICATIONS

[ ] : Specifications for V-422

CRT

Type

Large 6" screen with internal graticule

Approximate 2kV [12kV] acceleration potential

Screen type

P31 phosphor standard

Useful screen area

8 × 10 div

Graticule

Internal graticule with centimeter divisions and 2 mm subdivisions along the centeral axis, 10 % and 90 % lines are indicated.

Illumination continuously variable. (For : V-222, V-422)

Focussing

Possible (with automatic focus correction circuit : V-222 and V-422)

Trace rotation	Provided
Scale illumination	Variable (For : V-222, V-422)
Intensity control	Provided

Z-AXIS INPUT (INTENSITY MODULATION)

DC-coupled, positive-going signal decreases intensity: 5 Vp-p signal causes noticeable modulation at normal intensity: DC to 2 MHz.

Input impedance	47 kΩ (typ.) [33 kΩ (typ.)]
Maximum input voltage	30 V (DC + peak AC)
Coupling	DC

VERTICAL DEFLECTION SYSTEMS (2 Identical Channels)

Bandwidth and rise time

DC to at least 20 MHz [40 MHz] and rise time 17.5 ns [8.8 ns] or less.

DC to at least 7 MHz and rise time 50 ns or less at magnifier extends.

The AC coupled lower -3 dB point is 10 Hz or less.

Deflection factor

5 mV/div to 5 V/div in 10 calibrated steps, in a 1-2-5 sequence.

The uncalibrated continuous control extends deflection factor to at least 12.5 V per division in the 5 volts/div position. The ×5 magnifier increases sensitivity of each deflection factor setting to 1 mV/div.

Accuracy

±3 % (+10 to +35 °C)

Additional error for magnifier ±2 %

Display modes

CH1, CH2 (normal or invert), Alternate, Chopped (Approx. 250 kHz), Added

Input impedance

1 MΩ ±3 % in parallel with 23 ± 3 pF

Maximum input voltage

300 V (DC + peak AC)

Input coupling

AC, GND, DC

HORIZONTAL DEFLECTION SYSTEM

Time base

0.2 μs/div to 0.2 s/div in 19 calibrated steps, in a 1-2-5 sequence.

The uncalibrated continuous control extends deflection factor to at least 0.5 seconds per division in the 0.2 sec/div position. The ×10 magnifier extends maximum sweep rate to 100 ns/div [20 ns/div].

Accuracy

±3 % (+10 to +35 °C)

Additional error for magnifier ±2 %

TRIGGERING SYSTEM

Trigger modes

Automatic, Normal, TV (TV-H or TV-V)

Trigger source

Internal (CH1, CH2, V.MODE), Line, External : V-212, V-222, V-422

Internal, Line, External, EXT-H : V-211

Trigger slope

+ or -

TV sync polarity

TV (-)

Triggering level variable range — Internal ; ±6 div or more; External ; approx. ±2 V

Triggering sensitivity and frequency

Frequency	Internal (V.MODE)	External
20 Hz - 2 MHz [20 Hz - 5 MHz]	0.5 div (2.0 div)	200 mV
2 - 20 MHz [5 - 40 MHz]	1.5 div (3.0 div)	800 mV

(Except ; (V.MODE) : V-211)

TV-V, TV-H sensitivity: SYNC level more than 1 div or 1 V

AUTO: Approx. 25 Hz (when time base is 0.1 μs/div to 2 ms/div)

Trigger coupling

AC : 25 Hz to full bandwidth

External trigger input impedance

1 MΩ +20 % in parallel with 25 pF ±5 pF

(EXT ⊠ ; about 100 kΩ : V-211)

Maximum input voltage

300 V (DC + AC to 1 kHz or less)

X-Y OPERATION

V·INPUT ; Vert, EXT TRIG IN ; Horiz : V-211

CH1 ; Horiz, CH2 ; Vert : V-212, V-222, V-422

Deflection factor

Same as vertical deflection

(X-axis; about 200 mV/div : V-211)

Accuracy

Y: ±3 % (+10 to +35 °C)

X: ±5 % (+10 to +35 °C)

Additional error for magnifier ±2 %

X-bandwidth

DC to at least 500 kHz

Phase error

3 ° or less from DC to 50 kHz : V-212, V-222, V-422

3 ° or less from DC to 10 kHz : V-211

CALIBRATOR

An approx. 1 kHz frequency 0.5 V (± 3%) square wave.

POWER SUPPLY

VOLTAGE (50/60 Hz)	FUSE
100 V (90 - 110 V)	2A
120 V (108 - 132 V)	2A
220 V (198 - 242 V)	1A
240 V (216 - 264 V)	1A

Nominal voltage ± 5 % at 400 Hz

Power supply frequency : 50, 60, 400 Hz

Power consumption : Approximately 30 W

ENVIRONMENT

Limit of operation temperature	0 - 40 °C
Limit of operation humidity	35 - 85 %
Rated range of use temperature	10 - 35 °C
Rated range of use humidity	45 - 85 %
Storage and transportation temperature	-20 - 70 °C

DIMENSIONS AND WEIGHT

Approx. 310(W) ×130(H) × 370(D) mm
(12.4(W) × 5.2(H) × 14.8(D) inch)
Approx. 6 kg (13.5 lbs): for V-211, V-212
Approx. 6.5 kg (14.6 lbs): for V-222, V-422

2. ACCESSORIES

This instrument is shipped along with following accessories.

—— V-211 ——

1 Probe (AT-10AJ 1.5)
1 AC power cord
1 Operation Manual

—— V-212 ——

2 Probes (AT-10AJ 1.5)
1 AC power cord
1 Operation Manual

—— V-222/V-422 ——

2 Probes (AT-10AK 1.5)
1 AC power cord
1 Operation Manual

3. PREVENTIVE MAINTENENCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the oscilloscope. The severity of environment to which this instrument is subjected will determine the frequency of maintenance. A convenient time to perform preventive maintenance is just prior to the recalibration of the instrument.

Disassembly

Remove all of the screws on the top cover of the instrument, then gently remove the top cover.

Take the same procedure for the bottom cover.

Most of the internal parts of the instrument are now accessible.

(See section 10. Exploded view)

Cleaning

The instrument should be cleaned as often as the operating conditions require, since the accumulation of dirt in the instrument may cause the component breakdown.

The covers can provide protection against dust in the interior of the instrument. Loose dust accumulated on these covers can be removed with a soft cloth or small brush.

Dirt that remains can be removed with a soft cloth applying in a mild detergent and water solution. Abrasive cleaners should not be used.

Cleaning the interior should be only occasionally necessary. The best way to clean the interior is to blow off the dust with a dry, low-velocity stream of air. A soft-bristle brush or a cotton-tipped applicator is useful for cleaning narrow spaces or for cleaning more delicate components.

Visual inspection

The instrument should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is apparent; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates

other trouble in the instrument; therefore, correcting the cause of the overheating is important to prevent the recurrance of the damage.

4. CALIBRATION

Hitachi Denshi, Ltd. provides complete instrument repair and recalibration at our office, and authorized dealer. Contact your local Hitachi Denshi sales office or representative.

4. 1 Calibration interval

To maintain instrument accuracy, perform the calibration of the V-211, V-212, V-222, V-422 at least every 1000 hours of operations or every six month if used infrequently.

4. 2 Test equipment required

The following test equipment and accessories, or its equivalent, are required for the complete calibration of the V-211, V-212, V-222, V-422. Specifications given for the test equipment are the minimum necessary for accurate calibration. Therefore, the specifications of any test equipment used must meet or exceed the listed specifications.

All the test equipment is assumed to be correctly calibrated and operated within the listed specification. Operating instructions for the test equipment are not given in this procedure. Refer to the instruction manual for the test equipment if more information is needed.

4. 3 Preliminary procedure

This instrument should be calibrated at an ambient temperature of +20 °C ($\pm$5 °C) for best overall accuracy.

1. Connect the instrument to AC line voltage, 50/60/400 Hz line source.
2. Set the instrument controls as given in the preliminary control settings. Allow at least fifteen minutes of warmup before proceeding.
3. See the adjustment locations in the pullout pages.

Table 4-2

TEST EQUIPMENT REQUIRED

Description	Minimum specification	Usage	Example of applicable test equipment
1. Constant amplitude signal generator	50kHz reference frequency; maximum frequency 70MHz; variable amplitude	Check horizontal, vertical and trigger bandwidth.	
2. Standard amplitude calibrator	Amplitude accuracy: 0.25%, variable amplitude; 5mV to 40V; frequency: 1 kHz square wave	Check horizontal and vertical gain.	
3. Square-wave generator	Variable frequency: 10Hz to 1MHz; output amplitude; 10mV to 100V	Check probe and vertical compensation.	
4. Digital voltmeter	0.1% accuracy	Check power supply.	
5. Time mark generator	0.1% accuracy	Check horizontal timing.	
6. Cable	Impedance, 50 ohms; type, RG-58/U; length, 42 inches, connectors, BNC	External trigger operation check. Horizontal gain check and adjustment.	Hitachi part No.4202
7. Termination	Impedance, 50 ohms; connectors, BNC	Vertical amplifier compensation checks and adjustment.	
8. Attenuator	Ratio, 1/10; connectors, BNC; impedance, 50 ohms	Vertical amplifier bandwidth check.	
9. T-connector	Connectors, BNC	External trigger operation checks.	Hitachi part No.1301

4. 4 Preliminary control settings

Set the instrument controls as follows, when starting the calibration procedures.

Controls	Settings	Controls	Settings
FOCUS	Midrange		
TRACE ROTATION	As desired		
- VERT -			
V. POSITION	Midrange, pushed in	SWP VAR	Fully clockwise
V. VARIABLE	CAL, fully clockwise	CH1 ALT MAG	Normal (Button Out)
INPUT COUPLING	GND (AC-GND-DC)	- TRIG -	
VOLTS/DIV	5 mV/DIV		
V.MODE	CH1	LEVEL	Midrange, Normal
CH2 INV	Normal, Pushed in	SLOPE	+ Normal
- HORZ -			
H. POSITION	Midrange	MODE	AUTO
PULL ×10 MAG	Normal, Pushed in	SOURCE	INT
TIME/DIV	1 ms	INT TRIG	CH1

4. 5 Initial starting procedure

1. Rotate the INTENsity control to the midrange and set the POWER switch to ON.
2. Wait a few seconds for the cathode ray tube (CRT) to warm up. A trace should appear on the CRT.
3. If trace disappears, increase (clockwise) the INTENsity control setting until the trace is easily observed, or roughly check/adjust the DC balance to get a trace as same as (13).
4. Adjust the FOCUS control for the best focused display.
5. Readjust the POSITION controls if necessary, to center the trace.

POWER SUPPLY SYSTEM

NOTE

Before you start operation, see the adjustment locations in the pullout pages.

Control settings

Preset the controls as given in the preliminary control setting

(1) Check low-voltage supply, if necessary.

a. Connect the digital voltmeter (DVM) between the +8 V line (P1105-2) and ground

: +7.3 to +8.3 V

b. Connect the DVM between the -8 V line (P1105-4) and ground

: -8.3 to -7.7 V

c. Connect the DVM between the +5 V line (P1105-3) and ground

: +4.8 to +5.2 V

d. Connect the DVM from the +120 V/+75 V line (P1105-1) and ground

: +110 to +130 V (For V-211, V-212, V-222)

: +67.5 to +82.5 V(For V-422)

(2) Check high voltage supply.

a. Connect the DVM to the H.V. test point (P1001-1) with a high voltage probe.

b. Check for a reading of -1.995 to 1.805 kV --- V-211, V-212, V-222

-1.732 to 1.568 kV --- V-422

DISPLAY

Control setting

Preset the controls as given in the preliminary control setting.

(3) Check/adjust CRT bias.

Set the Trig MODE switch to the AUTO, and set the TIME/DIV switch to the 1 ms.

a. Connect the digital voltmeter (DVM) to the R904 (or D1022-Ⓐ) and ground.

b. Adjust the INTENSITY control so that the DVM indicates 15.0 V.

c. Observe the trace of CRT.

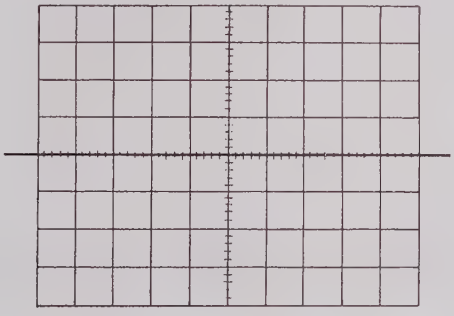
d. Adjust the grid bias adjustment RV1021 for the trace makes a just appear.

④ Check/adjust trace rotation.

a. Position the trace to the center graticule line.

b. Check that the trace is in parallel with the center horizontal line.

c. Adjust TRACE ROTATION (screwdriver adjustment on front panel) for a trace that is in parallel with the horizontal graticule lines.



⑤ Check/adjust GEOMetry

a. Set the TIME/DIV to the 0.1 ms, and the input coupling switch to DC.

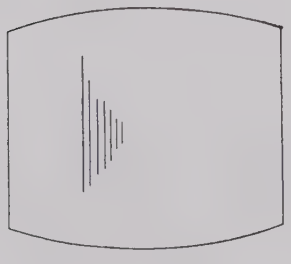
b. Connect the constant amplitude signal generator to the input.

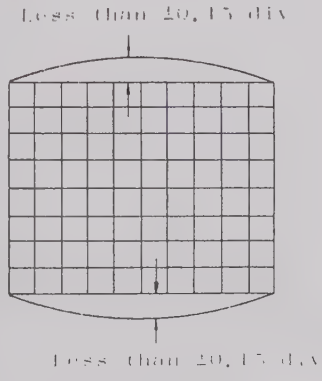
c. Set the VOLTS/DIV switch setting for a full-screen (8 division) deflection.

d. Check that horizontal bowing is less than ±0.15 division.

For V-422

e. Adjust the GEOM adjustment RV1033 for a display so that horizontal bowing is less than ±0.15 division.

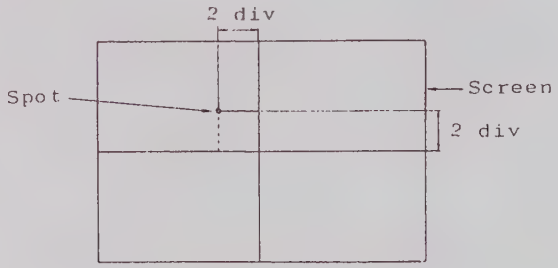




⑥ Check/adjust ASTIGmatism and FOCUS.

a. Set the TIME/DIV switch to the X-Y position, and the input coupling switch to GND.

b. Set the INTENsity control for a small spot, as the following figure, using the position controls.



c. Check that the spot is round.

d. Adjust the FOCUS adjustment and ASTIG adjustment RV1035 for a round spot.

HORIZONTAL SYSTEM

Control settings

Preset the controls as given in the preliminary control settings.

⑦ Check/adjust horizontal gain.

a. Set the input AC-GND-DC to DC.

b. Connect the cable to the output of the time mark generator.

c. Set the time mark generator for 1 ms time marks.

d. Check that the time marks align with the graticule lines over the center eight divisions, within 3 %.

e. Adjust the H GAIN adjustment RV824 so that the time marks coincide with the middle eight graticule lines.

⑧ Check/adjust Horizontal ×10 MAG Gain.

a. Set the TIME/DIV switch to 1 ms.

b. Set ×10 MAG (pull out the knob of the POSITION control).

c. Check that the one-cycle time marks align with the ten-divisions graticule lines, within 5 %.

d. Adjust the MAG GAIN adjustment RV831 so that one-cycle time marks coincide with the ten-division graticule lines.

e. Push in the POSITION control after adjustment and check.

⑨ Check/adjust MAG CENT.

a. Set the TIME/DIV switch to 1 ms.

b. So that the knob of H.POSITION is pulled out (×10 MAG), the left end of the trace is brought to the center point and then the knob of H.POSITION is depressed.

c. Observe the movement of the left end of the trace.

d. Adjust the MAG CENT adjustment RV821 for the movement of the left end of the trace within $\pm$0.2 div.

⑩ Check/adjust low speed sweep accuracy.

a. Set the time mark generator for 10 ms time marks.

b. Set the TIME/DIV switch to 10 ms.

c. Check that the time marks align with the graticule lines over the middle eight divisions, within 3 %.

d. Adjust the 10 ms/DIV adjustment RV542 so that the time marks coincide with the middle eight graticule lines.

⑪ Check/adjust high speed sweep accuracy.

a. Set the input coupling switch to DC.

b. Set the time mark generator for 2 μs time marks.

c. Set the TIME/DIV switch to 2 μs.

d. Check that the time marks align with the graticule lines over the middle eight divisions.

e. Adjust CV520 so that the time marks coincide with middle eight graticule lines.

⑫ Check/adjust high speed ×10 MAG GAIN

a. Set the TIME/DIV switch to the 2 μs.

b. Set ×10 MAG (pull out the knob of the POSITION control).

c. Check that the one-cycle time marks align with the ten-divisions graticule lines, within 5 %.

d. Adjust the high speed Mag gain adjustment CV840 so that one-cycle time marks align with the ten-division graticule lines.

e. Push in the POSITION control after adjustment and check.

⑬ Check/adjust DC balance (Step attenuator balance).

a. Set the VOLTS/DIV switch to the 5 mV position.

b. Position the trace to the horizontal center line.

c. Change the VOLTS/DIV switch to the 10 mV position.

d. Check that the trace is within ±0.05 division of the center horizontal line.

e. Adjust the CH1 (CH2) DC BAL adjustment, RV22 (CH1) or RV122 (CH2), for a trace at the horizontal center line.

f. Repeat the part (a) through (e) until less than ±0.05 division shift is noted when changing the VOLTS/DIV setting.

⑭ Check/adjust vertical position center.

For V-211, V-212

a. Confirm the vertical POSITION control at the midrange.

b. Check the trace is within 1 division.

c. Adjust the position center adjustment RV63 (CH1), RV163 (CH2) for a trace at the horizontal center line.

For V-222, V-422 (CH1 only)

a. Pull out the vertical POSITION control (set the DC OFFSET mode).

b. Connect a DVM to the DC OFFSET VOLT OUTput terminal.

c. Adjust the vertical POSITION control so that the DVM indicates 0 V.

d. Adjust the position center adjustment RV63 (CH1 only), for a trace at the horizontal center line.

For V-222, V-422 (CH2)

e. Confirm the vertical POSITION control at the midrange.

f. Check the trace is within 1 division.

g. Adjust the position center adjustment RV163 (CH2) for a trace at the horizontal center line.

⑮ Check/adjust ×1 AC GAIN.

a. Set the TIME/DIV switch to the 1 ms position.

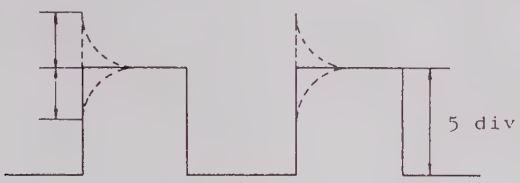
b. Set the VOLTS/DIV switch to the 10 mV position.

c. Set the input coupling switch to DC.

d. Connect the square-wave generator (using 1 kHz output range).

e. Adjust the output amplitude of that generator for 5 division deflection of screen.

f. Check the high-voltage level of pulse is flat.



g. Adjust the ×1 AC GAIN RV33 (CH1), RV133 (CH2) adjustment for a flat level.

⑯ Check/adjust vertical gain.

a. Set the VOLTS/DIV switch to the 10 mV position and the input coupling switch to DC.

b. Connect the standard amplitude calibrator to the input connector.

c. Set the standard amplitude calibrator for a 50 mVp-p (5 divisions for display) signal.

d. Check for a display of five divisions.

e. Adjust the GAIN adjustment RV62 (CH1), RV162 (CH2) for a display of 5 divisions within 2 %.

f. Check all the VOLTS/DIV switch settings.

⑰ Check/adjust input capacity (ATT: ÷ 1).

a. Set the VOLTS/DIV switch to the 10 mV position.

b. Set the input coupling switches to DC.

c. Connect the L-C meter to the input terminals.

d. Check the input capacity for approx. 23 pF.

⑱ Check/adjust vertical step response.

a. Set the VOLTS/DIV switch to the 5 mV position.

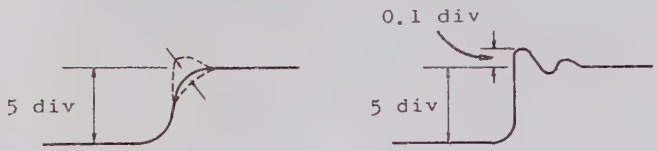
b. Set the TIME/DIV switch to the 0.5 μs position.

c. Connect the fast-rise, positive output (50 mV, 1 MHz) of the square-wave generator to the input. Use a 50 Ω termination and cable.

d. Adjust the square-wave generator output for a 5-divisions display.

e. CH1 - Adjust CV336 (and CV355 : V-422 only) so that a square wave is flat. Then, adjust CV337 for overshoot of +0.2 div.

CH2 - Adjust CV161 for overshoot of +0.2 div.



⑲ Check/adjust attenuation compensation.

(ATT : ÷10, ÷100)

a. Set the input coupling switch to DC.

b. Connect the square-wave generator to the CH1 (CH2) input terminal check for a square wave that is flat (flat top) under the following settings.

ATT	VOLTS/DIV	Square-wave generator output
÷10	0.1 V	0.5 V
÷100	1 V	5 V

c. Adjust the trimmer capacitors (refer to the circuit board illustration with adjustment location - page 27) for a square wave that is flat (flat top) under the following settings.

ATT	VOLTS/DIV	Square-wave generator output	Adjust CH1 (CH2)
÷10	0.1 V	0.5 V	CV4 (CV104)
÷100	1 V	5 V	CV7 (CV107)

⑳ Check/adjust input capacity (ATT: ÷10, ÷100).

a. Connect the L-C meter to the input connector.

b. Check the input capacity for approximately 23 pF.

c. Adjust the trimmer capacitors for a 2 pF input capacity under the following settings.

ATT	VOLTS/DIV	Adjust CH1 (CH2)
÷1	5 mV	—
÷10	0.1 V	CV3 (CV103)
÷100	1 V	CV6 (CV106)

(21) X-Y operation

For V-212, V-222, V-422

21-1 Check/adjust X gain.

a. Set the TIME/DIV switch to X-Y, the input coupling switch of CH1 to AC, the input coupling switch of CH2 to GND.

b. Set the VOLTS/DIV switch to the 10 mV position.

c. Connect the standard amplitude calibrator to the CH1 input connector.

d. Set the standard amplitude calibrator for 50 mV.

e. Check for a display of five divisions.

f. Adjust the X GAIN adjustment RV550 for a display of five divisions within 6 %.

For V-211

21-2 Check/adjust X gain.

a. Set the TIME/DIV switch to X-Y, the trig SOURCE switch to EXT ⊠, the input coupling switch of vertical INPUT to GND.

b. Connect the standard amplitude calibrator to the EXT TRIG OR ⊠ INput connector.

c. Set the standard amplitude calibrator for 1 V.

d. Check for a display of five divisions.

e. Adjust the X GAIN adjustment RV550 for a display of five divisions within 6 %.

21-3 Check/adjust X position center.

a. Set the TIME/DIV switch to the X-Y position, and the horizontal

POSITION control to the midposition, the input coupling switch of CH1 to GND.

b. Check to see that the round spot is near the center graticule and is within ±0.2 division against horizontal line.

c. Adjust the X CENT adjustment RV85 to the position spot at the center.

TRIGGER SYSTEM

㉒ Check/adjust TRIG CENT.

a. Set the TRIG SOURCE switch to INT, the INT TRIG switch to CH1, the TRIG SLOPE knob push in, the VOLTS/DIV switch to 50 mV, the TIME/DIV switch to 10 μs.

b. Connect the sine-wave generator to the input connector for a 0.5 div (50 kHz).

c. Set the TRIG LEVEL knob to the midposition.

d. Adjust RV420 so that synchronization is effected on the waveform, 0.5 div on the screen.

e. Next, set the TRIG SLOPE to - (pulled out state) and insure that the waveform is triggered. After confirmation, leave the TRIG SLOPE in depressed state. Readjust when stepped out.

㉓ Check/adjust CH2 TRIG BAL.

a. Set the VOLTS/DIV switch to 50 mV (CH1 and CH2), the TIME/DIV switch to 10 μs, the TRIG SOURCE switch to INT, the INT TRIG switch to VERT MODE, the V.MODE switch to ALT, and the CH1 POSITION knob to the midposition.

b. Connect the sine-wave generator to the input connectors (CH1 and CH2) for a 5 div (50 kHz).

c. Adjust CH2 POSITION control so that CH2 waveform comes to CH1.

d. Next, adjust RV185 so that both waveforms (CH1 and CH2) coincides.

CALIBRATOR

㉔ Check/adjust CAL terminal (0.5 Vp-p, 1 kHz).

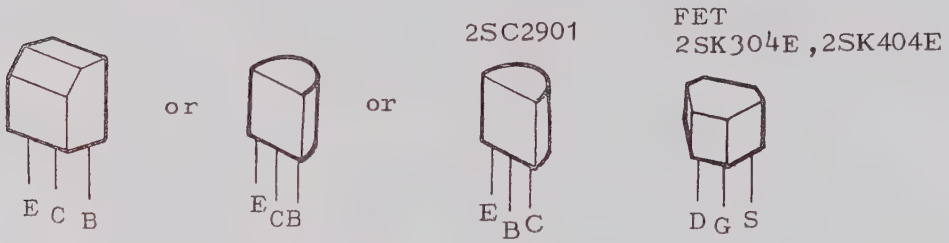
a. Connect the CAL terminal to the digital multimeter, short the terminal 1 to 3 of the connector (P1206).

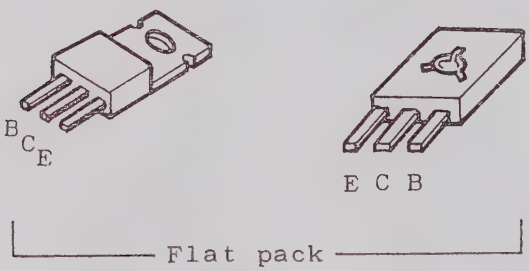
b. Check for the CAL output of 0.5 V, within 1 %.

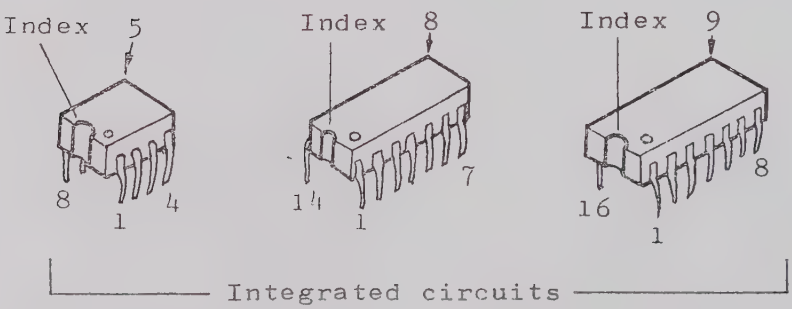
c. Adjust the 0.5 V adjustment RV1201 for the CAL output of 0.495 to 0.505 V.

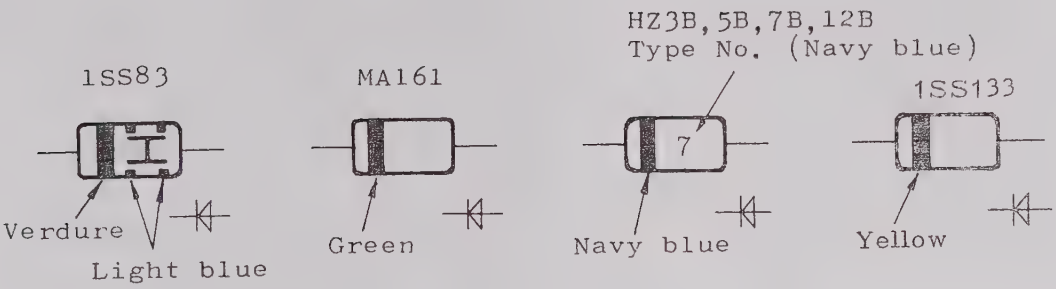
5. SEMICONDUCTOR LEAD CONFIGURATIONS

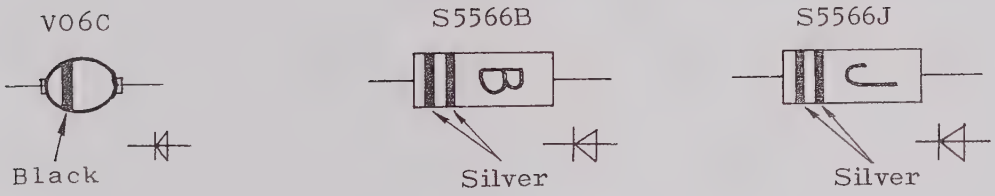
Lead configurations and case styles are typical, but may vary due to vendor changes or instrument modifications.

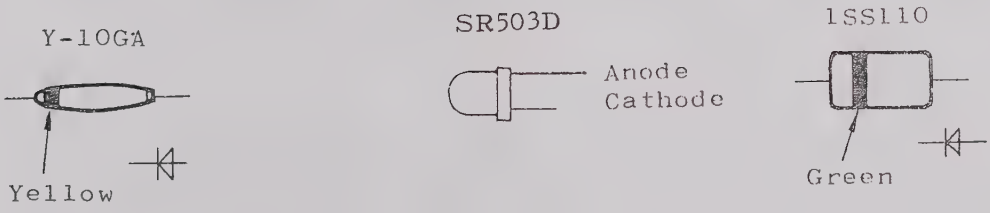







1SS83
Verdure
Light blue
MA161
Green
HZ3B,5B,7B,12B
Type No. (Navy blue)
7
Navy blue
1SS133
Yellow


V06C
Black
S5566B
B
Silver
S5566J
C
Silver


Y-10GA
Yellow
SR503D
Anode
Cathode
1SS110
Green

6. CIRCUIT DESCRIPTION

— Introduction —

This section of the manual contains a description of the circuitry used in V-211/V-212/V-222/V-422 Oscilloscope.

The block diagram (p. 31) shows the overall relationship between all of the circuits. Complete schematics of each circuit are also given in section Schematic diagrams (p. 51 to 129). Refer to these diagrams throughout the following circuit description for electrical values and relationships.

CHANNELS 1 and 2 VERTICAL PREAMP

Input signals for vertical deflection on the CRT can be connected to the "CH1 OR X " and (or) "CH2 OR Y " input connectors. In the X-Y mode of operation, CH1 input signal provides the horizontal (X-axis) deflection and CH2 input signal provides the vertical (Y-axis) deflection.

The Channel 1 and 2 Vertical Preamp circuits provide control of input coupling, vertical deflection factor, DC balance, vertical position and vertical gain.

They also contain a stage to provide a sample of the input signal to the Trigger Preamp circuit for internal triggering from the Channel 1 and (or) Channel 2 signal only.

VERTICAL SWITCHING CIRCUIT

The vertical switching circuit determines whether the CH1 or CH2 or both Vertical Preamp output signals are connected to the Vertical Output Amplifier circuit (through the Delay Line Driver and Delay Line stages: V-422 only).

In the ALT and CHOP modes, both channels are alternately displayed on a shared time basis.

VERTICAL OUTPUT AMPLIFIER

The Vertical Output Amplifier circuit provides the final amplification for the signal before it is applied to the vertical deflection plates of the CRT.

TRIGGER PREAMP

The Trigger Preamp circuit amplifies the internal trigger signal to the

level necessary to drive the Trigger Generator circuit.
Input signal for the Trigger Preamp circuit is obtained by sampling the signal applied to Channel 1 or the composite vertical signal from the Vertical Switching circuit.
This circuit also provides a signal to the Horizontal Amplifier for X-Y mode operation.

TRIGGER GENERATOR

The Trigger Generator circuit produces trigger pulses to start the Sweep Generator circuit. These trigger pulses are derived either from the internal trigger signal from the vertical deflection system, an external signal connected to the EXT TRIG INput connector or a sample of the line voltage applied to the instrument.
Controls are provided in this circuit to select trigger level, slope and source.
The Trigger MODE switch determines the operating mode for the trigger circuit. In the NORM Trig position, a sweep is produced only when a trigger pulse is received from the Trigger Generator circuit. Operation in the AUTO Trig mode is the same mode as NORM Trig mode, except that a free-running trace is displayed when a trigger pulse is not present or when the amplitude of the trigger signal is not adequate.

SWEEP GENERATOR

The Sweep Generator circuit produces a sawtooth voltage which is amplified by the Horizontal Amplifier circuit to provide horizontal deflection on the CRT. This sawtooth voltage is generated on command (trigger pulse) from the Trigger Generator circuit.
The Sweep Generator circuit also produces an unblanking gate to unblank the CRT during sweep time.

HORIZONTAL AMPLIFIER

The Horizontal Amplifier circuit provides the output signal to the CRT horizontal deflection plates. In all positions of the TIME/DIV select switch except X-Y, the horizontal deflection signal is a sawtooth from the Sweep Generator circuit. In the X-Y position, the horizontal deflection

signal is obtained from the Channel 1 Vertical Preamp (or X-SIGNAL PREAMP : V-211 only) through the Trigger Preamp circuit. In addition, the horizontal amplifier contains the horizontal magnifier and the horizontal positioning circuits.

POWER SUPPLY

The low-voltage Power Supply circuit provides the operating power for this instrument from four regulated supplies and one unregulated supply. The Power Input stage is provided with a Voltage Selector Assembly. This selector allows selection of the nominal operating voltage and regulating range for the instrument.

CALIBRATOR

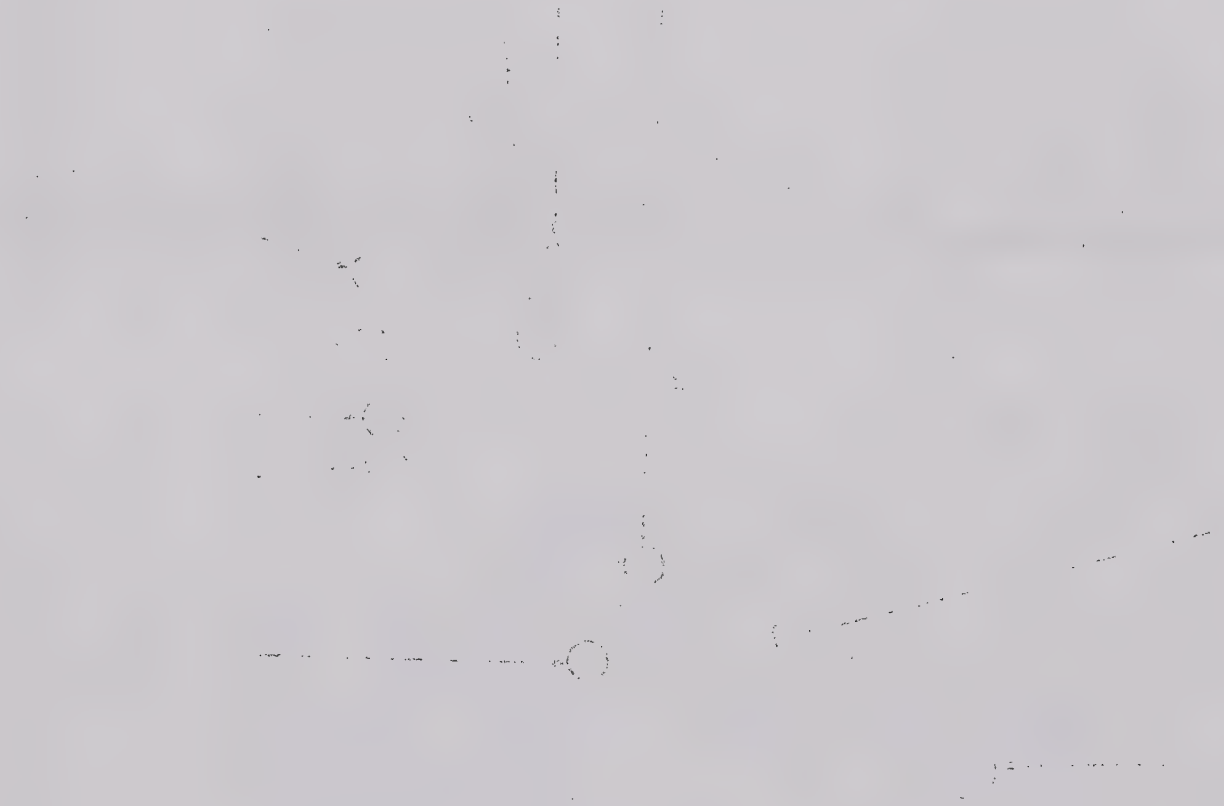
The Calibrator circuit produces a square-wave output with accurate amplitude and frequency. This output is available as a square-wave voltage at the CAL 0.5 V (1 kHz) connector.

Z AXIS AMPLIFIER

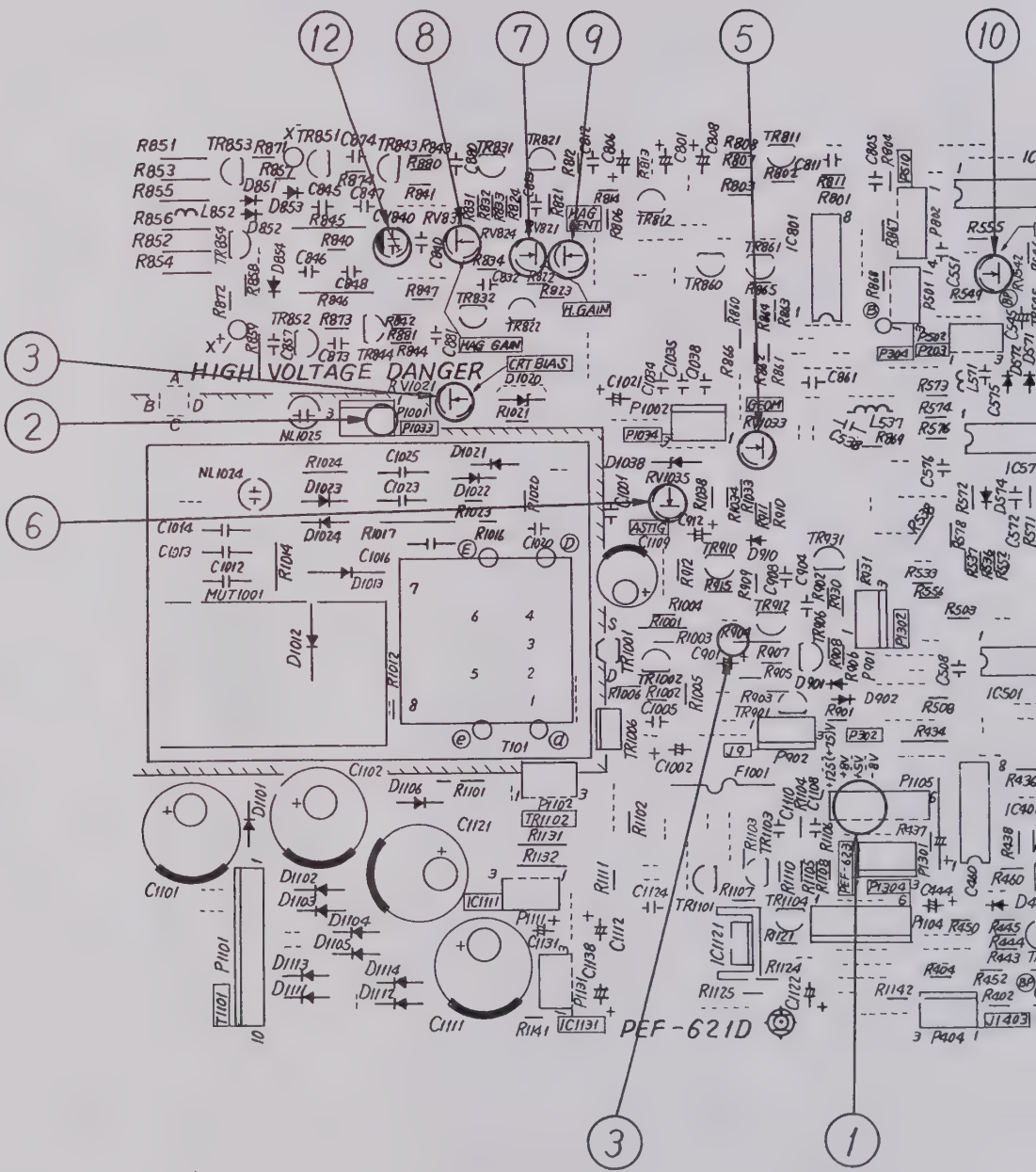
The Z-Axis Amplifier circuit controls the CRT intensity level from several inputs. The effect of these input signals is to either increase or decrease the trace intensity, or to completely blank portions of the display.

CRT CIRCUIT

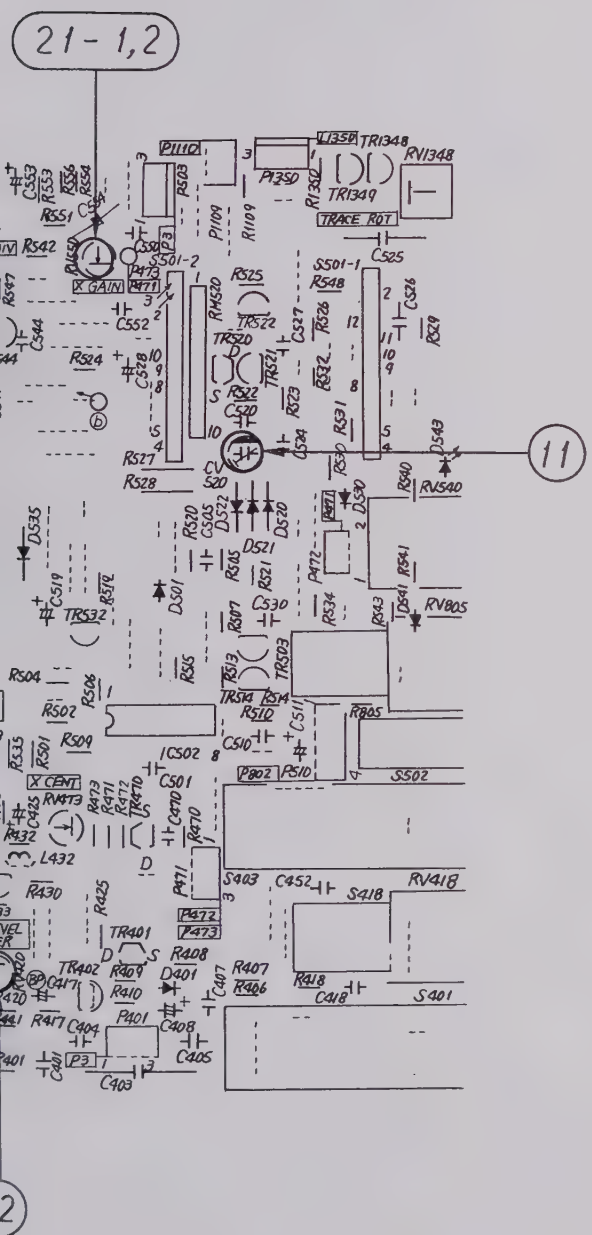
The CRT Circuit provides the high-voltage and control circuits necessary for operation of the cathode-ray tube (CRT).



7. ELECTRICAL PARTS ARRANGEMENT (WITH ADJUSTMENT LOCATIONS)

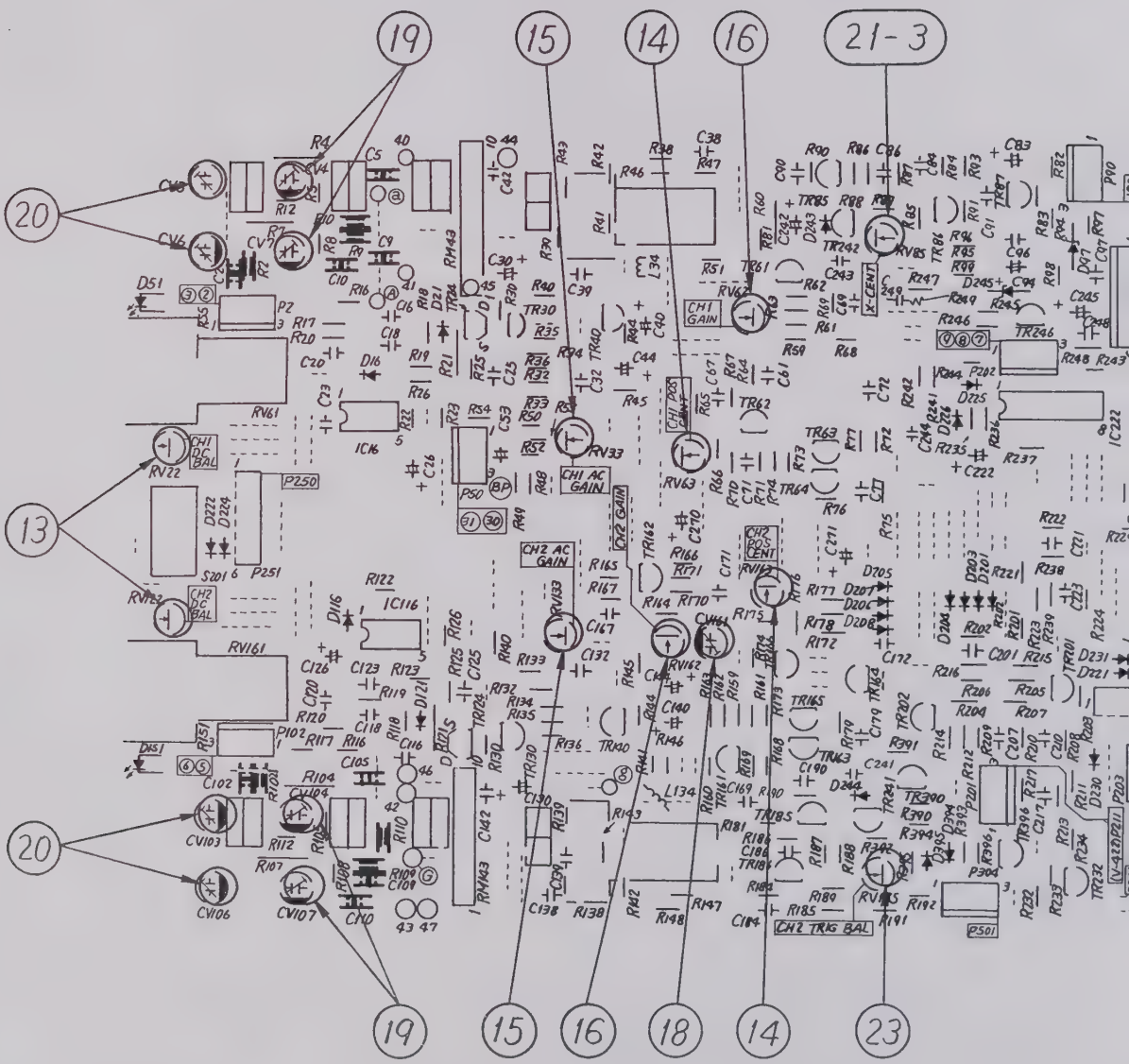


PEF-621D PCB

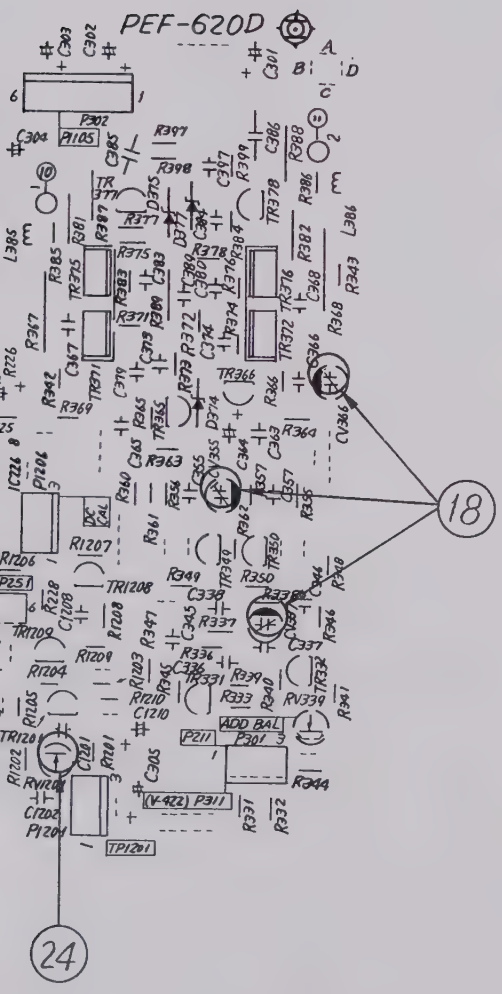


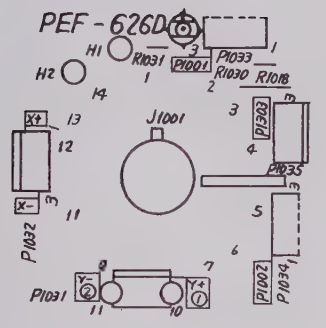
PEF-625D PCB

PEF-623D PCB

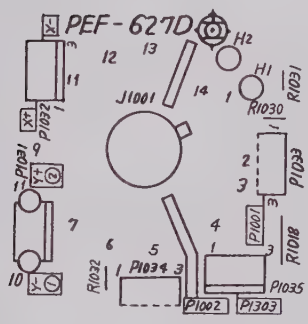

19
15
14
16
21-3
20
13
20
19
15
16
18
14
23
CH1 DC BAL
CH2 DC BAL
CH1 AC GAIN
CH2 AC GAIN
CH1 GAIN
CH2 GAIN
CH1 POS CENT
CH2 POS CENT
X-CENT
CH2 TRIG BAL

PEF-620D PCB

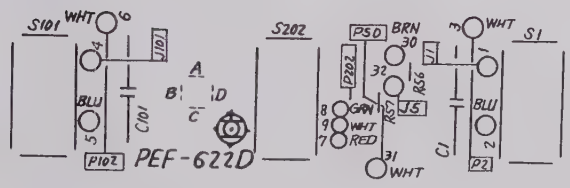




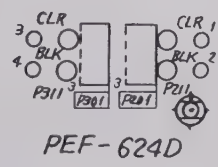
PEF-626D PCB



PEF-627D PCB

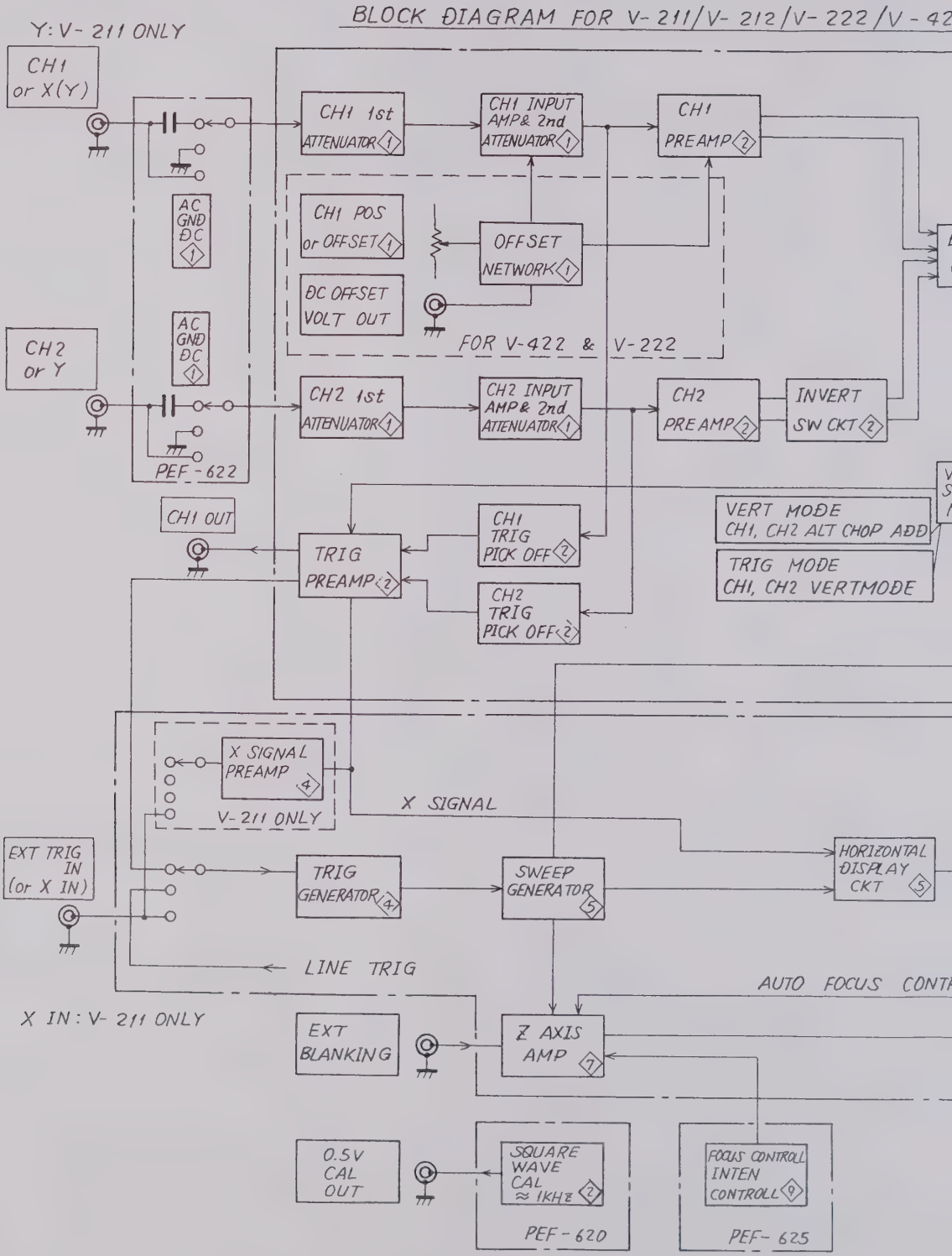


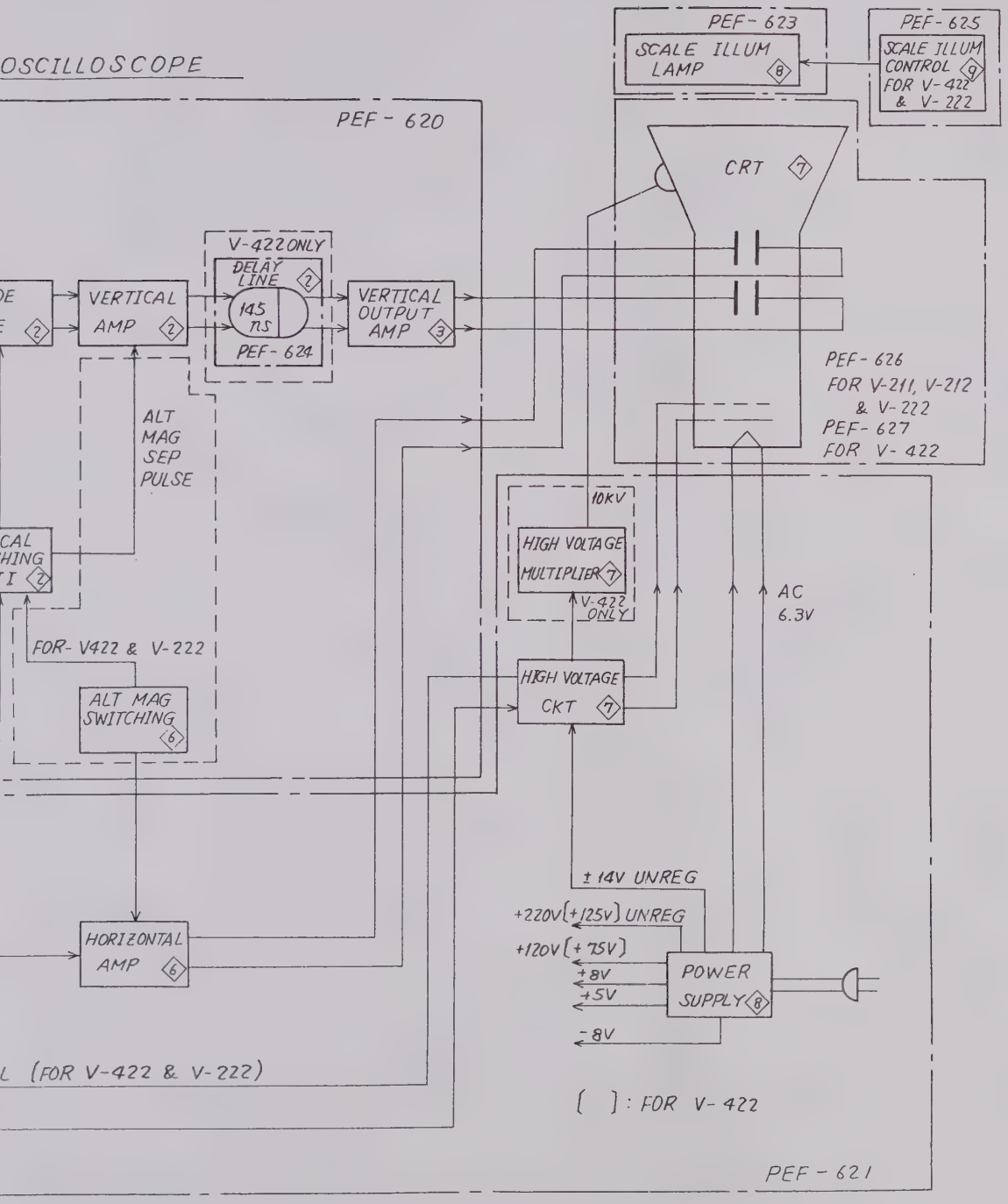
PEF-622D PCB



PEF-624D PCB

8. BLOCK DIAGRAM





BLOCK DIAGRAM

9. ELECTRICAL PARTS LIST Note; A:V-211/B:V-212/C:V-222/D:V-422

◇1 INPUT AMP

CH1 and CH2 INPUT

Symbol	Part Code	Description	Q'ty A	B	C	D
C 1	CQX0068	C, Plastic 400V 0.047μF ±10%	1	1	1	1
C 101	CQX0068	C, Plastic 400V 0.047μF ±10%		1	1	1
S 1	8393985	SW, Lever, SLE623	1	1	1	1
S 101	8393985	SW, Lever, SLE623		1	1	1
S 202	8398985	SW, Lever, SLE623		1	1	1
PEF-622		PCB PB-14	R	R	R	R

CH1 1st ATTENUATOR

Symbol	Part Code	Description	Q'ty A	B	C	D
R 2	RME0860	R, MET Chip 1/8W 470Ω ±5%	1	1	1	1
R 4	RMS0043	R, Metal 1/4W 900kΩ ±0.5%	1	1	1	1
R 5	RME1163	R, Metal 1/4W 111kΩ ±0.5%	1	1	1	1
R 7	RMS0044	R, Metal 1/4W 990kΩ ±0.5%	1	1	1	1
R 8	RME1156	R, Metal 1/4W 10.1kΩ ±0.5%	1	1	1	1
R 9	RME0852	R, MET, Chip 1/8W 10Ω ±5%	1	1	1	1
R 10	RME0864	R, MET, Chip 1/8W 100Ω ±5%	1	1	1	1
R 12	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
C 2	CCG0132	C, Ceramic Chip 50V 22pF ±5%				1
C 5	CCG0139	C, Ceramic Chip 50V 47pF ±5%	1	1	1	1
C 9	CCG0144	C, Ceramic Chip 50V 220pF ±5%	1	1	1	1
C 10	CCG0142	C, Ceramic Chip 50V 82pF ±5%	1	1	1	1
CV 3	CVE0046	C, Variable ECR-HA010A11	1	1	1	1
CV 4	CVE0050	C, Variable ECR-HA007A11	1	1	1	1
CV 6	CVE0046	C, Variable ECR-HA010A11	1	1	1	1
CV 7	CVE0048	C, Variable ECR-HA003A11	1	1	1	1
AIT 1	8398872	SW, Rotary ADR-255S	1	1	1	1

CH1 INPUT AMP and 2nd ATTENUATOR

Symbol	Part Code	Description	Q'ty A	B	C	D
R 16	RME1168	R, Metal 1/4W 500kΩ ±0.5%	1	1	1	1
R 17	RME1168	R, Metal 1/4W 500kΩ ±0.5%	1	1	1	1
R 18	RCE0757	R, Carbon 1/4W 100Ω ±5%	1	1	1	1
R 19	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1	1	1	1
R 20	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1	1	1	1
R 21	RSE0434	R, Solid 1/4W 10MΩ ±5%	1	1	1	1
R 22	RCE0791	R, Carbon 1/4W 68kΩ ±5%	1	1	1	1
R 23	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1	1	1	1
R 25	RCE0757	R, Carbon 1/4W 100Ω ±5%	1	1	1	1

Symbol	Part Code	Description	Q'ty A	B	C	D
R 25	RCE0755	R, Carbon 1/4W 68Ω ±0.5%	1	1	1	1
R 26	RME1081	R, Metal 1/4W 5.62kΩ ±1%	1	1	1	1
R 26	RME1079	R, Metal 1/4W 3.92kΩ ±1%				1
R 30	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%				1
R 30	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	1
R 32	RCE0753	R, Carbon 1/4W 47Ω ±5%				1
R 34	RME1145	R, Metal 1/4W 60.0Ω ±0.5%	1	1	1	1
R 35	RCE0766	R, Carbon 1/4W 560Ω ±5%	1	1	1	1
R 36	RME1154	R, Metal 1/4W 600Ω ±0.5%	1	1	1	1
R 33	RCE0762	R, Carbon 1/4W 270Ω ±5%	1	1	1	1
R 40	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	1
R 41	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	1
R 42	RCE0764	R, Carbon 1/4W 390Ω ±5%	1	1	1	1
R 43	RCE0767	R, Carbon 1/4W 680Ω ±5%	1	1	1	1
R 44	RCE0767	R, Carbon 1/4W 680Ω ±5%	1	1	1	1
R 44	RCE0765	R, Carbon 1/4W 470Ω ±5%			1	1
R 45	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	1
R 46	RME1157	R, Metal 1/4W 16.0kΩ ±0.5%	1	1	1	1
R 47	RME1162	R, Metal 1/4W 80.0kΩ ±0.5%	1	1	1	1
R 48	RME1155	R, Metal 1/4W 4.00kΩ ±0.5%			1	1
RM 43	3173846	R, Block For ATT	1	1	1	1
C 16	CCD0286	C, Ceramic 500V 1000pF +100 -0%	1	1	1	1
C 18	CCC0996	C, Ceramic 50V 2pF ±0.25%	1	1	1	1
C 20	CCC1014	C, Ceramic 50V 47pF ±5%	1	1	1	1
C 23	CQA0091	C, Plastic 50V 0.001μF ±10%	1	1	1	1
C 25	CCC1014	C, Ceramic 50V 47pF ±5%	1	1	1	1
C 26	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 30	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 32	CCC1002	C, Ceramic 50V 10pF ±0.5%				1
C 40	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 42	CCC1007	C, Ceramic 50V 22pF ±5%	1	1	1	1
C 44	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 53	CEX0563	C, Alelyc 16V 10μF BP			1	1
RV 22	RNE0057	VR, Metal EVN49C00YB54 (50K)	1	1	1	1
RV 33	RNE0048	VR, Metal EVN39C00YB24 (200)	1	1	1	1
TR 24	HIK0099	Transistor 2SK404E	1	1	1	
TR 30	HTC0148	Transistor 2SC458C	1	1	1	
TR 30	HTC0557	Transistor 2SC1674K				1
TR 40	HTA0224	Transistor 2SA1029D	1	1	1	
L 34	TLE0107	Coil ELE-VR47MA	1	1	1	1
IC 16	8397023	IC LF411CN	1	1	1	1
D 16	HDS0417	Diode 1SS133	1	1	1	1
D 21	HDS0477	Diode 1SS110	1	1	1	1
D 51	HDS0407	Diode SR503D (RED)			1	

DC OFFSET NETWORK

Symbol		Part Code	Description			Q'ty A	B	C	D
R	48	RME1157	R, Metal	1/4W	16.0kΩ ±0.5%			1	1
R	49	RME1155	R, Metal	1/4W	4.00kΩ ±0.5%			1	1
R	50	RME1157	R, Metal	1/4W	16.0kΩ ±0.5%			1	1
R	51	RCE0769	R, Carbon	1/4W	1kΩ ±5%			1	1
R	52	RME1069	R, Metal	1/4W	562Ω ±5%			1	1
R	53	RCE0777	R, Carbon	1/4W	4.7kΩ ±5%			1	1
R	54	RCE0769	R, Carbon	1/4W	1kΩ ±5%			1	1
R	55	RCE0771	R, Carbon	1/4W	1.5kΩ ±5%			1	1
R	56	RME1157	R, Metal	1/4W	16.0kΩ ±0.5%			1	1
R	57	RME1155	R, Metal	1/4W	4.00kΩ ±0.5%			1	1
RV	61	8348452	VR, Carbon	EVH-CCAK20B14		1	1		
RV	61	RDE0003	VR, Carbon	EVH-YK3325B14				1	1

CH2 1st ATTENUATOR

Symbol		Part Code	Description			Q'ty A	B	C	D
R	102	RME0860	R, MET, Chip	1/8W	47Ω ±5%		1	1	1
R	104	RMS0043	R, Metal	1/4W	900Ω ±0.5%		1	1	1
R	105	RME1163	R, Metal	1/4W	111kΩ ±0.5%		1	1	1
R	107	RMS0044	R, Metal	1/4W	990kΩ ±1%		1	1	1
R	108	RME1156	R, Metal	1/4W	10.1kΩ ±0.5%		1	1	1
R	109	RME0852	R, MET, Chip	1/8W	10Ω ±5%		1	1	1
R	110	RME0864	R, MET, Chip	1/8W	100Ω ±5%		1	1	1
R	112	RCE0749	R, Carbon	1/4W	22Ω ±5%		1	1	1
C	102	CCG0132	C, CER, Chip	50V	22pF ±5%				1
C	105	CCG0139	C, CER, Chip	50V	47pF ±5%		1	1	1
C	109	CCG0144	C, CER, Chip	50V	220pF ±5%		1	1	1
C	110	CCG0142	C, CER, Chip	50V	82pF ±5%		1	1	1
CV	103	CVE0046	C, Variable	ECR-HA010A11			1	1	1
CV	104	CVE0050	C, Variable	ECR-HA007A11			1	1	1
CV	106	CVE0046	C, Variable	ECR-HA010A11			1	1	1
CV	107	CVE0048	C, Variable	ECR-HA003A11			1	1	1
ATT	101	8398872	SW, Rotary	ADR-255S			1	1	1

CH2 INPUT AMP and 2nd ATTENUATOR

Symbol		Part Code	Description				Q'ty A	B	C	D
R	116	RME1168	R, Metal	1/4W	500kΩ	±0.5%		1	1	1
R	117	RME1168	R, Metal	1/4W	500kΩ	±0.5%	1	1	1	1
R	118	RCE0757	R, Carbon	1/4W	100Ω	±5%		1	1	1
R	119	RCE0793	R, Carbon	1/4W	100kΩ	±5%		1	1	1
R	120	RCE0793	R, Carbon	1/4W	100kΩ	±5%		1	1	1
R	121	RSE0434	R, Solid	1/4W	10MΩ	±5%		1	1	1
R	122	RCE0791	R, Carbon	1/4W	68kΩ	±5%		1	1	1
R	123	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	1
R	125	RCE0757	R, Carbon	1/4W	100Ω	±5%			1	1
R	125	RCE0755	R, Carbon	1/4W	68Ω	±5%				1
R	126	RME1081	R, Metal	1/4W	5.62kΩ	±1%		1	1	
R	126	RME1079	R, Metal	1/4W	3.92kΩ	±1%				1
R	130	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%		1	1	
R	130	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R	132	RCE0753	R, Carbon	1/4W	47Ω	±5%				1
R	133	RCE0762	R, Carbon	1/4W	270Ω	±5%		1	1	1
R	134	RME1145	R, Metal	1/4W	60.0Ω	±0.5%		1	1	1
R	135	RCE0766	R, Carbon	1/4W	560Ω	±5%		1	1	1
R	136	RME1154	R, Metal	1/4W	600Ω	±0.5%		1	1	1
R	140	RCE0745	R, Carbon	1/4W	10Ω	±5%		1	1	1
R	141	RCE0745	R, Carbon	1/4W	10Ω	±5%		1	1	1
R	142	RCE0764	R, Carbon	1/4W	390Ω	±5%		1	1	1
R	143	RCE0767	R, Carbon	1/4W	680Ω	±5%		1	1	1
R	144	RCE0767	R, Carbon	1/4W	680Ω	±5%		1	1	
R	144	RCE0766	R, Carbon	1/4W	560Ω	±5%				1
R	145	RCE0745	R, Carbon	1/4W	10Ω	±5%		1	1	1
R	146	RME1157	R, Metal	1/4W	16.0kΩ	±0.5%		1	1	1
R	147	RME1162	R, Metal	1/4W	80.0kΩ	±0.5%		1	1	1
R	148	RME1155	R, Metal	1/4W	4.00kΩ	±0.5%		1	1	1
R	151	RCE0769	R, Carbon	1/4W	1kΩ	±5%			1	1
RM	143	3173846	R, Block For	ATT				1	1	1
C	116	CCD0286	C, Ceramic	500V	1000pF	+100 −0%		1	1	1
C	118	CCC0996	C, Ceramic	50V	2pF	±0.25%		1	1	1
C	120	CCC1014	C, Ceramic	50V	47pF	±5%		1	1	1
C	123	CQA0091	C, Plastic	50V	1000pF	±10%		1	1	1
C	125	CCC1014	C, Ceramic	50V	47pF	±5%		1	1	1
C	126	CES0028	C, Alelyc	10V	47μF	±20%		1	1	1
C	130	CES0028	C, Alelyc	10V	47μF	±20%		1	1	1
C	132	CCC1002	C, Ceramic	50V	10pF	±0.5%				1
C	140	CES0028	C, Alelyc	10V	47μF	±20%		1	1	1
C	142	CCC1007	C, Ceramic	50V	22pF	±5%		1	1	1
C	144	CES0028	C, Alelyc	10V	47μF	±20%		1	1	1
RV	122	RNE0057	VR, Metal	EVN49C00YB54 (50k)				1	1	1
RV	133	RNE0048	VR, Metal	EVN39C00YB22 (200)				1	1	1
TR	124	HTK0099	Transistor	2SK404E				1	1	1
TR	130	HTC0148	Transistor	2SC458C				1	1	
TR	130	HTC0557	Transistor	2SC1674K						1
TR	140	HTA0224	Transistor	2SA1029D				1	1	1
IC	116	8397023	IC	LF411CN				1	1	1
L	134	TLE0107	Coil	ELE-VR47MA				1	1	1
D	116	HDS0437	Diode	1SS133				1	1	1
D	121	HDS0477	Diode	1SS110				1	1	1
D	151	HDS0407	Diode	SR503D (RED)						1

PANEL and OTHERS

Symbol	Part Code	Description				Q'ty			
						A	B	C	D
R 13	RCE0753	R, Carbon	1/4W	47Ω	±5%				1
R 113	RCE0753	R, Carbon	1/4W	47Ω	±5%				1
C 13	CCC1004	C, Ceramic	50V	15 pF	±5%				1
C 113	CCC1004	C, Ceramic	50V	15 pF	±5%				1
J 1	JHB0088	CON, Coax	BNC071			1	1	1	1
J 5		Jack	TJ-10A	(RED)				1	1
J 101	JHD0088	CON, Coax	BNC071				1	1	1

② VERT PREAMP, TRIG PICKOFF CH SW MULTI

CH1 PREAMP

Symbol	Part Code	Description				Q'ty A	B	C	D
R 59	RCE0761	R, Carbon	1/4W	22Ω	±5%	1	1	1	
R 59	RCE0759	R, Carbon	1/4W	150Ω	±5%				1
R 60	RCE0797	R, Carbon	1/4W	220kΩ	±5%	1	1	1	
R 60	RCE0795	R, Carbon	1/4W	150kΩ	±5%				1
R 61	RCE0745	R, Carbon	1/4W	10Ω	±5%	1	1	1	
R 61	RCE0752	R, Carbon	1/4W	39Ω	±5%				1
R 62	RCE0755	R, Carbon	1/4W	68Ω	±5%	1	1	1	
R 62	RCE0753	R, Carbon	1/4W	47Ω	±5%				1
R 63	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%	1	1	1	
R 63	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R 64	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%	1	1	1	
R 64	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R 65	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1	1	1	1
R 66	RCE0785	R, Carbon	1/4W	22kΩ	±5%	1	1	1	1
R 67	RCE0578	R, Carbon	1/4W	120Ω	±5%	1	1	1	1
R 68	RCE0749	R, Carbon	1/4W	22Ω	±5%	1	1	1	1
R 69	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%	1	1	1	
R 69	RCE0767	R, Carbon	1/4W	680Ω	±5%				1
R 70	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%	1	1	1	
R 70	RCE0767	R, Carbon	1/4W	680Ω	±5%				1
R 71	RCE0749	R, Carbon	1/4W	22Ω	±5%	1	1	1	1
R 72	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	1
R 73	RME1070	R, Metal	1/4W	681Ω	±1%	1	1	1	
R 73	RME1191	R, Metal	1/4W	432Ω	±1%				1
R 74	RME1070	R, Metal	1/4W	681Ω	±1%	1	1	1	
R 74	RME1191	R, Metal	1/4W	432Ω	±1%				1
R 75	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%	1	1	1	1
R 76	RCE0765	R, Carbon	1/4W	470Ω	±5%	1	1	1	1
R 77	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	1
C 61	CCC1011	C, Ceramic	50V	33pF	±5%				1
C 61	CCC1007	C, Ceramic	50V	10pF	±0.5pF	1	1	1	
C 67	CQA0099	C, Plastic	50V	0.022μF	±10%	1	1	1	
C 67	CQA0097	C, Plastic	50V	0.001μF	±10%				1
C 69	CCC1365	C, Ceramic	50V	680pF	±10%	1	1	1	1
C 71	CCC1365	C, Ceramic	50V	680pF	±10%	1	1	1	1
C 72	CCC1030	C, Ceramic	50V	10000pF	±10%	1	1	1	1
C 77	CCCU997	C, Ceramic	50V	3pF	±0.25pF	1	1	1	1
RV 62	RNE0049	VR, Metal	EVN39C00YB12 (100)			1	1	1	1
RV 63	RNE0047	VR, Metal	EVN39C00YB54 (50K)			1	1	1	1
TR 61	HTC0168	Transistor	2SC535C			1	1	1	1
TR 62	HTC0168	Transistor	2SC535C			1	1	1	1
TR 63	HTA0224	Transistor	2SA1029D			1	1	1	1
TR 64	HTA0224	Transistor	2SA1029D			1	1	1	1

CH2 PREAMP and INVERT SW CKT

Symbol	Part Code	Description				Q'ty A	B	C	D
R 159	RCE0761	R, Carbon	1/4W	220Ω	±5%		1	1	
R 159	RCE0759	R, Carbon	1/4W	150Ω	±5%				1

Symbol	Part Code	Description				Q'ty A	B	C	D
R 160	RCE0797	R, Carbon	1/4W	220kΩ	±5%		1	1	
R 160	RCE0795	R, Carbon	1/4W	150kΩ	±5%				1
R 161	RCE0745	R, Carbon	1/4W	10Ω	±5%		1	1	1
R 162	RCE0753	R, Carbon	1/4W	47Ω	±5%				1
R 162	RCE0755	R, Carbon	1/4W	68Ω	±5%		1	1	
R 163	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%		1	1	
R 163	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R 164	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%		1	1	
R 164	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R 165	RCE0781	R, Carbon	1/4W	10kΩ	±5%		1	1	1
R 166	RCE0785	R, Carbon	1/4W	22kΩ	±5%		1	1	1
R 167	RCE0758	R, Carbon	1/4W	120Ω	±5%		1	1	1
R 168	RCE0749	R, Carbon	1/4W	22Ω	±5%		1	1	1
R 169	RCE0767	R, Carbon	1/4W	680Ω	±5%				1
R 169	RCE0770	R, Carbon	1/4W	2.2kΩ	±5%		1	1	
R 170	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%		1	1	
R 170	RCE0767	R, Carbon	1/4W	680Ω	±5%				1
R 171	RCE0749	R, Carbon	1/4W	22Ω	±5%		1	1	1
R 172	RCE0753	R, Carbon	1/4W	47Ω	±5%		1	1	1
R 173	RME1070	R, Metal	1/4W	681Ω	±1%		1	1	
R 173	RME1191	R, Metal	1/4W	432Ω	±1%				1
R 174	RME1070	R, Metal	1/4W	681Ω	±1%		1	1	
R 174	RME1191	R, Metal	1/4W	432Ω	±1%				1
R 175	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%		1	1	1
R 176	RCE0765	R, Carbon	1/4W	470Ω	±5%		1	1	1
R 177	RCE0765	R, Carbon	1/4W	470Ω	±5%		1	1	1
R 178	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%		1	1	1
R 179	RCE0753	R, Carbon	1/4W	47Ω	±5%		1	1	1
C 167	CQA0099	C, Plastic	50V	0.022μF	±10%		1	1	
C 167	CQA0097	C, Plastic	50V	0.01μF	±10%				1
C 169	CCC1365	C, Ceramic	50V	680pF	±10%		1	1	1
C 171	CCC1365	C, Ceramic	50V	680pF	±10%		1	1	1
C 172	CCC1030	C, Ceramic	50V	10000pF	±10%		1	1	1
C 179	CCC1030	C, Ceramic	50V	10000pF	±10%		1	1	1
RV 161	RDE0003	VR, Carbon	EVH-YK3325B14				1	1	1
RV 162	RNE0049	VR, Metal	EVN39C00YB12 (100)				1	1	1
RV 163	RNE0047	VR, Metal	EVN39C00YB54 (50K)				1	1	1
CV 161	CVE0047	C, Variable	ECR-HA020D11				1	1	
CV 161	CVE0049	C, Variable	ECR-HA040E11						1
TR 161	HTC0168	Transistor	2SC535C				1	1	1
TR 162	HTC0168	Transistor	2SC535C				1	1	1
TR 163	HTA0224	Transistor	2SA1029D				1	1	1
TR 164	HTA0224	Transistor	2SA1029D				1	1	1
TR 165	HTA0224	Transistor	2SA1029D				1	1	1
TR 166	HTA0224	Transistor	2SA1029D				1	1	1

DIODE GATE and VERTICAL AMP

Symbol	Part Code	Symbol				Q'ty A	B	C	D
R 201	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%		1	1	
R 201	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%				1
R 202	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%		1	1	
R 202	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%				1
R 203	RME1066	R, Metal	1/4W	332Ω	±5%	1	1	1	
R 203	RME1063	R, Metal	1/4W	182Ω	±5%				1
R 204	RME1066	R, Metal	1/4W	332Ω	±5%	1	1	1	
R 204	RME1063	R, Metal	1/4W	182Ω	±5%				1
R 205	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	
R 205	RCE0766	R, Carbon	1/4W	560Ω	±5%				1
R 206	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	1
R 207	RCE0785	R, Carbon	1/4W	22kΩ	±5%	1	1	1	
R 207	RCE0782	R, Carbon	1/4W	12kΩ	±5%				1
R 208	RME1066	R, Metal	1/4W	332Ω	±5%	1	1	1	
R 208	RME1064	R, Metal	1/4W	221Ω	±5%				1
R 209	RME1066	R, Metal	1/4W	332Ω	±5%	1	1	1	
R 209	RME1064	R, Metal	1/4W	221Ω	±5%				1
R 210	RCE0789	R, Carbon	1/4W	47kΩ	±5%				1
R 210	RCE0791	R, Carbon	1/4W	68kΩ	±5%	1	1	1	
R 211	RCE0766	R, Carbon	1/4W	560Ω	±5%	1	1	1	
R 211	RCE0768	R, Carbon	1/4W	820Ω	±5%				1
R 212	RCE0766	R, Carbon	1/4W	560Ω	±5%	1	1	1	
R 212	RCE0768	R, Carbon	1/4W	820Ω	±5%				1
R 213	RME1107	R, Metal	1/4W	86.6Ω	±1%				1
R 213	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	
R 214	RME1107	R, Metal	1/4W	86.6Ω	±1%				1
R 214	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	
R 215	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%	1	1	1	
R 215	RCE0772	R, Carbon	1/4W	1.8kΩ	±5%				1
R 216	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%	1	1	1	
R 216	RCE0772	R, Carbon	1/4W	1.8kΩ	±5%				1
R 217	RCE0761	R, Carbon	1/4W	220Ω	±5%				1
C 201	CCC1030	C, Ceramic	50V	10000pF	±10%		1	1	1
C 207	CCC1014	C, Ceramic	50V	47pF	±5%	1	1	1	
C 207	CCC1025	C, Ceramic	50V	100pF	±5%				1
C 210	CEX0563	C, Alelyc	16V	10μF	BP	1	1	1	1
C 217	CCC1002	C, Ceramic	50V	10pF	±0.5pF				1
TR 201	HTC0338	Transistor	2SC1906			1	1	1	1
TR 202	HTC0338	Transistor	2SC1906			1	1	1	1
D 201	HDS0437	Diode	1SS133				1	1	1
D 202	HDS0437	Diode	1SS133				1	1	1
D 203	HDS0437	Diode	1SS133				1	1	1
D 204	HDS0437	Diode	1SS133				1	1	1
D 205	HDS0437	Diode	1SS133				1	1	1
D 206	HDS0437	Diode	1SS133				1	1	1
D 207	HDS0437	Diode	1SS133				1	1	1
D 208	HDS0437	Diode	1SS133				1	1	1

VERTICAL SWITCHING MULTI

Symbol	Part Code	Description				Q'ty A	B	C	D
R 221	RCE0750	R, Carbon	1/4W	27Ω	±5%		1	1	
R 221	RCE0758	R, Carbon	1/4W	120Ω	±5%				
R 222	RCE0761	R, Carbon	1/4W	220Ω	±5%		1	1	
R 222	RCE0758	R, Carbon	1/4W	120Ω	±5%				
R 223	RCE0750	R, Carbon	1/4W	27Ω	±5%		1	1	
R 223	RCE0748	R, Carbon	1/4W	18Ω	±5%				
R 224	RCE0761	R, Carbon	1/4W	220Ω	±5%		1	1	
R 224	RCE0758	R, Carbon	1/4W	120Ω	±5%				
R 225	RCE0789	R, Carbon	1/4W	47kΩ	±5%		1	1	
R 226	RCE0749	R, Carbon	1/4W	10Ω	±5%	1	1	1	
R 228	RCE0789	R, Carbon	1/4W	47kΩ	±5%		1	1	
R 229	RCE0776	R, Carbon	1/4W	3.9kΩ	±5%		1	1	
R 230	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	
R 231	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	
R 232	RCE0769	R, Carbon	1/4W	1kΩ	±5%		1	1	
R 232	RCE0768	R, Carbon	1/4W	820Ω	±5%				1
R 233	RCE0781	R, Carbon	1/4W	10kΩ	±5%		1	1	1
R 234	RCE0781	R, Carbon	1/4W	10kΩ	±5%		1	1	1
R 235	RCE0789	R, Carbon	1/4W	47kΩ	±5%		1	1	1
R 236	RCE0789	R, Carbon	1/4W	47kΩ	±5%		1	1	1
R 237	RCE0789	R, Carbon	1/4W	47kΩ	±5%		1	1	1
R 390	RCE0781	R, Carbon	1/4W	10kΩ	±5%			1	1
R 391	RCE0765	R, Carbon	1/4W	740Ω	±5%			1	1
R 392	RCE0778	R, Carbon	1/4W	5.6kΩ	±5%			1	1
R 393	RCE0767	R, Carbon	1/4W	680Ω	±5%			1	1
R 394	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%			1	1
R 395	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%			1	1
R 396	RCE0785	R, Carbon	1/4W	22Ω	±5%			1	1
C 221	CCC1160	C, Ceramic	50V	330pF	±10%		1	1	1
C 222	CES0028	C, Alelyc	10V	47μF	±20%		1	1	1
C 223	CCC1160	C, Ceramic	50V	330pF	±10%		1	1	1
C 224	CES0028	C, Alelyc	10V	47μF	±20%	1	1	1	1
TR 232	HTA0221	Transistor	2SA1029D				1	1	1
TR 390	HTC0148	Transistor	2SC458C					1	1
TR 396	HTC0148	Transistor	2SC458C					1	1
IC 222	IDH0467	IC	HD74LS00P				1	1	
IC 226	IDH0586	IC	HD74LS74AP			1	1	1	1
D 221	HDS0437	Diode	1SS133				1	1	
D 223	HDS0437	Diode	1SS133				1	1	
D 224	HDS0437	Diode	1SS133				1	1	
D 225	HDS0437	Diode	1SS133				1	1	1
D 226	HDS0437	Diode	1SS133				1	1	1
D 230	HDS0437	Diode	1SS133				1	1	1
D 231	HDS0437	Diode	1SS133				1	1	1
D 394	HDS0437	Diode	1SS133					1	1
D 395	HDS0437	Diode	1SS133					1	1
S 201	3165210	SW, Rotary	SBU 1025				1	1	
D 243	HDS0437	Diode	1SS133				1	1	
D 244	HDS0437	Diode	1SS133				1	1	
D 245	HDH0029	Diode	HZ5B			1	1	1	

CH1 TRIG PICKOFF and CH1 OUT

Symbol		Part Code	Description				Qty A	Qty B	Qty C	Qty D
R	81	RCE0693	R, Carbon	1/2W	100Ω	±5%				1
R	82	RME1107	R, Metal	1/4W	86.6Ω	±1%	1	1	1	1
R	83	RCE0757	R, Carbon	1/4W	100Ω	±5%	1	1	1	1
R	84	RCE0759	R, Carbon	1/4W	150Ω	±5%	1	1	1	1
R	85	RCE0783	R, Carbon	1/4W	15kΩ	±5%		1	1	1
R	86	RCE0771	R, Carbon	1/4W	1.5kΩ	±5%	1	1	1	
R	87	RCE0755	R, Carbon	1/4W	68Ω	±5%		1	1	
R	87	RCE0756	R, Carbon	1/4W	82Ω	±5%	1			
R	87	RCE0751	R, Carbon	1/4W	33Ω	±5%				1
R	88	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R	88	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R	89	RCE0773	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R	89	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R	90	RCE0763	R, Carbon	1/4W	330Ω	±5%	1	1	1	
R	90	RCE0745	R, Carbon	1/4W	10Ω	±5%				1
R	91	RCE0763	R, Carbon	1/4W	330Ω	±5%	1	1	1	
R	91	RCE0761	R, Carbon	1/4W	220Ω	±5%				1
R	92	RCE0787	R, Carbon	1/4W	33kΩ	±5%	1	1	1	1
R	93	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R	93	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R	94	RME1070	R, Metal	1/4W	681Ω	±5%				1
R	94	RCE0771	R, Carbon	1/4W	1.5kΩ	±5%	1	1	1	
R	95	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	1
R	96	RCE0755	R, Carbon	1/4W	68Ω	±5%	1	1	1	
R	86	RCE0757	R, Carbon	1/4W	100Ω	±5%				1
R	96	RCE0753	R, Carbon	1/4W	47Ω	±5%				1
R	97	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1			
R	97	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%		1	1	
R	97	RCE0781	R, Carbon	1/4W	10kΩ	±5%				1
R	98	RCE0767	R, Carbon	1/4W	680Ω	±5%		1	1	1
R	99	RCE0768	R, Carbon	1/4W	820Ω	±5%		1	1	
R	99	RCE0767	R, Carbon	1/4W	680Ω	±5%				1
C	83	CES0028	C, Alelyc	10V	47μF/LB		1	1	1	1
C	86	CCC1034	C, Ceramic	50V	68 pF	±5%				1
C	86	CCC1365	C, Ceramic	50V	680 pF	±10%	1	1	1	
C	90	CCC1365	C, Ceramic	50V	680 pF	±10%	1	1	1	1
C	91	CCC1365	C, Ceramic	50V	680 pF	±10%	1	1	1	1
C	94	CES0028	C, Alelyc	10V	47μF/LB		1	1	1	1
C	96	CCC1030	C, Ceramic	50V	10000 pF	±10%	1	1	1	1
C	97	CCC1007	C, Ceramic	50V	22 pF	±5%				1
C	97	CCC1027	C, Ceramic	50V	220 pF	±10%		1	1	
RV	85	RNE0051	VR, Metal	EVN39C00YB14 (10K)				1	1	1
TR	85	HTC0168	Transistor	2SC535C			1	1	1	1
TR	86	HTC0168	Transistor	2SC535C			1	1	1	1
TR	87	HTC0148	Transistor	2SC458C			1	1	1	1
D	97	HDH0024	Diode	HZ3B				1	1	1
L	98	TLF0067	Coil	FL-5H101K						1

CH2 TRIG PICKOFF

Symbol		Part Code	Description				Qty A	Qty B	Qty C	Qty D
R	181	RCE0757	R, Carbon	1/4W	100Ω	±5%				1
R	184	RCE0759	R, Carbon	1/4W	150Ω	±5%		1	1	1
R	185	RCE0783	R, Carbon	1/4W	15kΩ	±5%		1	1	1
R	186	RCE0771	R, Carbon	1/4W	1.5kΩ	±5%		1	1	
R	186	RCE0753	R, Carbon	1/4W	100Ω	±5%				1
R	187	RCE0755	R, Carbon	1/4W	68Ω	±5%		1	1	
R	187	RCE0751	R, Carbon	1/4W	33Ω	±5%				1
R	188	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	
R	188	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R	189	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	
R	189	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R	190	RCE0763	R, Carbon	1/4W	330Ω	±5%		1	1	
R	190	RCE0745	R, Carbon	1/4W	100Ω	±5%				1
R	191	RCE0776	R, Carbon	1/4W	3.9kΩ	±5%		1	1	
R	191	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%				1
R	192	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%		1	1	
R	192	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%				1
RV	185	RNE0051	VR, Metal	EVN39C00YB14 (10K)				1	1	1
C	186	CCC1365	C, Ceramic	50V	680 pF	±10%		1	1	
C	186	CCC1034	C, Ceramic	50V	68 pF	±5%				1
C	190	CCC1365	C, Ceramic	50V	680 pF	±10%		1	1	1
TR	185	HTC0168	Transistor	2SC535C				1	1	1
TR	186	HTC0168	Transistor	2SC535C				1	1	1

TRIG PREAMP

Symbol		Part Code	Description				Qty A	Qty B	Qty C	Qty D
R	241	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	1
R	242	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%		1	1	1
R	243	RCE0765	R, Carbon	1/4W	470kΩ	±5%		1	1	1
R	244	RCE0765	R, Carbon	1/4W	2.2kΩ	±5%		1	1	1
R	245	RCE0766	R, Carbon	1/4W	560Ω	±5%				1
R	245	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%	1	1	1	
R	246	RCE0768	R, Carbon	1/4W	560Ω	±5%				1
R	246	RCE0770	R, Carbon	1/4W	1.2kΩ	±5%	1	1	1	
R	247	RCE0768	R, Carbon	1/4W	820Ω	±5%	1	1	1	
R	247	RCE0765	R, Carbon	1/4W	470Ω	±5%				1
R	248	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	1
R	249	RCE0757	R, Carbon	1/4W	100Ω	±5%				1
C	241	CCC1030	C, Ceramic	50V	10000 pF	±10%		1	1	1
C	242	CES0028	C, Alelyc	10V	47μF	±20%		1	1	1
C	243	CCC1007	C, Ceramic	50V	22 pF	±5%		1	1	1
C	244	CCC1007	C, Ceramic	50V	22 pF	±5%		1	1	1
C	245	CES0028	C, Alelyc	10V	47μF	±20%	1	1	1	1
C	248	CCC1025	C, Ceramic	50V	100 pF	±5%				1
C	248	CCC1032	C, Ceramic	50V	82 pF	±5%	1	1	1	
C	249	CCC0999	C, Ceramic	50V	5 pF	±0.25pF				1
C	270	CES0028	C, Alelyc	10V	47μF	±20%	1	1	1	1

Symbol	Part Code	Description				Q'ty A	B	C	D
C 271	CES0028	C, Alelyc	10V	47μF	±20%	1	1	1	1
TR 241	HTC0192	Transistor	2SC641K				1	1	1
TR 242	HTC0192	Transistor	2SC641K				1	1	1
TR 246	HTA0224	Transistor	2SA1029D			1	1	1	
TR 246	HTA0099	Transistor	2SA781K						1

SQUARE WAVE CAL 1kHz

Symbol	Part Code	Description				Q'ty A	B	C	D
R 1201	RME1174	R, Metal	1/4W	2.00kΩ	±1%	1	1	1	1
R 1202	RME1065	R, Metal	1/4W	267Ω	±1%	1	1	1	1
R 1203	RCE0783	R, Carbon	1/4W	15kΩ	±5%	1	1	1	1
R 1204	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1	1	1	1
R 1205	RCE0783	R, Carbon	1/4W	15kΩ	±5%	1	1	1	1
R 1206	RCE0789	R, Carbon	1/4W	47kΩ	±5%	1	1	1	1
R 1207	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1	1	1	1
R 1208	RCE0787	R, Carbon	1/4W	33kΩ	±5%	1	1	1	1
R 1209	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1	1	1	1
R 1210	RCE0745	R, Carbon	1/4W	10Ω	±5%	1	1	1	1
C 1201	CCC1002	C, Ceramic	50V	10pF	±0.5pF	1	1	1	1
C 1202	CQA0091	C, Plastic	50V	0.001μF	±10%	1	1	1	1
C 1208	CQA0099	C, Plastic	50V	0.022μF	±10%	1	1	1	1
C 1210	CES0028	C, Alelyc	10V	47μF	±20%	1	1	1	1
RV 1201	RNE0058	VR, Metal	EVN39C00YB13	(1K)		1	1	1	1
TR 1201	HTA0224	Transistor	2SA1029D			1	1	1	1
TR 1208	HTC0148	Transistor	2SC458C			1	1	1	1
TR 1209	HTC0148	Transistor	2SC458C			1	1	1	1

PANEL and OTHERS

Symbol	Part Code	Description		Q'ty A	B	C	D
J 80	JHB0088	CON, Coax	BNC071	1	1	1	1
J 1201	JHB0088	CON, Coax	BNC071	1	1	1	1

DELAY LINE

Symbol	Part Code	Description		Q'ty A	B	C	D
DL 201	8311741	Delay Line	CD-3A				1
PEF-624		PCB	PB-14				R

③ V OUT AMP

Symbol	Part Code	Description	Q'ty A	B	C	D
R 331	RME1062	R, Metal 1/4W 150Ω ±1%	1	1	1	
R 331	RME1060	R, Metal 1/4W 100Ω ±1%				1
R 332	RME1062	R, Metal 1/4W 150Ω ±1%	1	1	1	
R 332	RME1060	R, Metal 1/4W 100Ω ±1%				1
R 333	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%				1
R 336	RCE0754	R, Carbon 1/4W 56Ω ±5%	1	1	1	
R 336	RCE0758	R, Carbon 1/4W 120Ω ±5%				1
R 337	RCE0745	R, Carbon 1/4W 10Ω ±5%				1
R 337	RCE0753	R, Carbon 1/4W 47Ω ±5%	1	1	1	
R 338	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%				1
R 338	RCE0759	R, Carbon 1/4W 150Ω ±5%	1	1	1	
R 339	RCE0765	R, Carbon 1/4W 470Ω ±5%				1
R 339	RCE0766	R, Carbon 1/4W 560Ω ±5%		1	1	
R 339	RCE0768	R, Carbon 1/4W 820Ω ±5%	1			
R 340	RCE0768	R, Carbon 1/4W 820Ω ±5%	1			
R 340	RCE0766	R, Carbon 1/4W 560Ω ±5%		1	1	
R 340	RCE0765	R, Carbon 1/4W 470Ω ±5%				1
R 341	RCE0745	R, Carbon 1/4W 10Ω ±5%				1
R 342	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1	1	1	
R 343	RCE0797	R, Carbon 1/4W 220kΩ ±5%	1	1	1	
R 344	RCE0757	R, Carbon 1/4W 100Ω ±5%	1			
R 344	RCE0755	R, Carbon 1/4W 68Ω ±5%		1	1	
R 345	RCE0753	R, Carbon 1/4W 47Ω ±5%				1
R 346	RCE0753	R, Carbon 1/4W 47Ω ±5%				1
R 347	RCE0759	R, Carbon 1/4W 150Ω ±5%				1
R 348	RCE0759	R, Carbon 1/4W 150Ω ±5%				1
R 349	RCE0759	R, Carbon 1/4W 150Ω ±5%				1
R 350	RCE0759	R, Carbon 1/4W 150Ω ±5%				1
R 355	RCE0756	R, Carbon 1/4W 82Ω ±5%				1
R 356	RCE0757	R, Carbon 1/4W 100Ω ±5%				1
R 357	RCE0745	R, Carbon 1/4W 10Ω ±5%				1
R 360	RCE0766	R, Carbon 1/4W 560Ω ±5%				1
R 361	RCE0766	R, Carbon 1/4W 560Ω ±5%				1
R 362	RCE0781	R, Carbon 1/4W 10kΩ ±5%				1
R 363	RME1065	R, Metal 1/4W 267Ω ±1%	1	1	1	
R 363	RME1066	R, Metal 1/4W 332Ω ±1%				1
R 364	RME1065	R, Metal 1/4W 267Ω ±1%	1	1	1	
R 364	RME1066	R, Metal 1/4W 332Ω ±1%				1
R 365	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	
R 365	RCE0769	R, Carbon 1/4W 1kΩ ±5%				1
R 366	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	
R 366	RCE0769	R, Carbon 1/4W 1kΩ ±5%				1
R 367	RMR3724	R, Metal 1W 10kΩ ±5%	1	1	1	
R 367	RMR3778	R, Metal 1W 6.8kΩ ±5%				1
R 368	RMR3724	R, Metal 1W 10kΩ ±5%	1	1	1	
R 368	RMR3778	R, Metal 1W 6.8kΩ ±5%				1
R 369	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
R 371	RCE0751	R, Carbon 1/4W 33Ω ±5%	1	1	1	1
R 372	RCE0751	R, Carbon 1/4W 33Ω ±5%	1	1	1	1
R 373	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
R 374	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
R 375	RCE0751	R, Carbon 1/4W 33Ω ±5%	1	1	1	1
R 376	RCE0751	R, Carbon 1/4W 33Ω ±5%	1	1	1	1
R 377	RCE0769	R, Carbon 1/4W 1kΩ ±5%	1	1	1	1
R 378	RCE0769	R, Carbon 1/4W 1kΩ ±5%	1	1	1	1
R 381	RCE0715	R, Carbon 1/4W 6.8kΩ ±5%	1	1	1	
R 381	RCE0711	R, Carbon 1/4W 3.3kΩ ±5%				1
R 382	RCE0715	R, Carbon 1/4W 6.8kΩ ±5%	1	1	1	
R 382	RCE0711	R, Carbon 1/4W 3.3kΩ ±5%				1
R 383	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
R 384	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
R 385	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	
R 385	RCE0763	R, Carbon 1/4W 330Ω ±5%				1

Symbol	Part Code	Description	Q'ty A	B	C	D
R 386	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	
R 386	RCE0763	R, Carbon 1/4W 330Ω ±5%				1
R 387	RCE0715	R, Carbon 1/4W 6.8kΩ ±5%	1	1	1	
R 387	RCE0711	R, Carbon 1/4W 3.3kΩ ±5%				1
R 388	RCE0715	R, Carbon 1/4W 6.8kΩ ±5%	1	1	1	
R 388	RCE0711	R, Carbon 1/4W 3.3kΩ ±5%				1
R 389	RCE0723	R, Carbon 1/4W 33kΩ ±5%	1	1	1	
R 389	RCE0721	R, Carbon 1/4W 22kΩ ±5%				1
R 398	RCE0414	R, Carbon 1/4W 120Ω ±5%	1	1	1	1
R 399	RCE0414	R, Carbon 1/4W 120Ω ±5%	1	1	1	1
C 355	CCC1002	C, Ceramic 50V 10pF ±0.5pF				1
C 357	CCC0999	C, Ceramic 50V 5pF ±0.25pF				1
C 365	CCC1034	C, Ceramic 50V 68pF ±5%	1	1	1	
C 365	CCC1004	C, Ceramic 50V 15pF ±5%				1
C 366	CCC1014	C, Ceramic 50V 47pF ±5%	1	1	1	
C 366	CCC1002	C, Ceramic 50V 10pF ±0.5pF				1
C 367	CCD0273	C, Ceramic 500V 2pF ±0.25pF	1	1	1	1
C 368	CCD0273	C, Ceramic 500V 2pF ±0.25pF	1	1	1	1
C 379	CCD0217	C, Ceramic 500V 1000pF +100 -0%	1	1	1	1
C 380	CCD0217	C, Ceramic 500V 1000pF +100 -0%	1	1	1	1
C 385	CCC0591	C, Ceramic 500V 10000pF +100 -0%	1	1	1	1
C 386	CCC0591	C, Ceramic 500V 10000pF +100 -0%	1	1	1	1
C 389	CCD0287	C, Ceramic 500V 4700pF +100 -0%	1	1	1	1
C 363	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1	1	1	1
C 301	CET0033	C, Alelyc 160V 1μF ±20%	1	1	1	1
C 302	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 303	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 304	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 305	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
C 337	CCC1032	C, Ceramic 50V 82pF ±10%	1	1	1	
C 338	CCC1011	C, Ceramic 50V 33pF ±10%	1	1	1	1
C 345	CCC1029	C, Ceramic 50V 1000pF +80 -20%				1
C 346	CCC1029	C, Ceramic 50V 1000pF +80 -20%				1
C 364	CES0028	C, Alelyc 10V 47μF ±20%	1	1	1	1
TR 331	HTA0099	Transistor 2SA781K				1
TR 331	HTC0192	Transistor 2SC641K	1	1	1	
TR 332	HTA0099	Transistor 2SA781K				1
TR 332	HTC0192	Transistor 2SC641K	1	1	1	
TR 349	HTC0721	Transistor 2SC2901				1
TR 350	HTC0721	Transistor 2SC2901				1
TR 365	HTC0721	Transistor 2SC2901	1	1	1	1
TR 366	HTC0721	Transistor 2SC2901	1	1	1	1
TR 376	HTA0258	Transistor 2SA1210S	1	1	1	1
TR 377	HTA0099	Transistor 2SA781K	1	1	1	1
TR 378	HTA0099	Transistor 2SA781K	1	1	1	1
TR 371	HTC0669	Transistor 2SC2912S	1	1	1	1
TR 372	HTC0669	Transistor 2SC2912S	1	1	1	1
TR 375	HTA0259	Transistor 2SA1210S	1	1	1	1
L 385	TLE0091	Coil ELE-V 2R2 MA	1	1	1	
L 385	TLE0109	Coil ELE-V R68 MA				1
L 386	TLE0091	Coil ELE-V 2R2 MA	1	1	1	
L 386	TLE0109	Coil ELE-V R68 MA				1
RV 339	RNE0050	VR, Metal EVN39C00YB52 (500)		1	1	
RV 339	RNE0048	VR, Metal EVN39C00YB22 (200)				1

Symbol	Part Code	Description		Q'ty			
				A	B	C	D
CV 337	CVE0049	C, Variable	ECR-HA040E11	1	1	1	1
CV 355	CVE0049	C, Variable	ECR-HA040E11				1
CV 366	CVE0049	C, Variable	ECR-HA040E11	1	1	1	
CV 366	CVE0047	C, Variable	ECR-HA020D11				1
D 374	HDH0029	Diode	HZ5B	1	1	1	1
D 375	HDH0029	Diode	HZ5B	1	1	1	1
D 377	HDH0029	Diode	HZ5B	1	1	1	1
PEF-620		PCB	PB-14	R	R	R	R

④ TRIG GENERATOR

Symbol	Part Code	Description				Q'ty A	B	C	D
R 401	RCE0800	R, Carbon	1/4W	470kΩ	±5%	1	1	1	1
R 402	RCE0755	R, Carbon	1/4W	68Ω	±5%	1	1	1	1
R 404	RCE0764	R, Carbon	1/4W	390Ω	±5%	1	1	1	1
R 406	RCE0800	R, Carbon	1/4W	470kΩ	±5%	1	1	1	1
R 407	RCE0761	R, Carbon	1/4W	220Ω	±5%	1	1	1	1
R 408	RCE0757	R, Carbon	1/4W	100Ω	±5%	1	1	1	1
R 409	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R 409	RCE0779	R, Carbon	1/4W	6.8kΩ	±5%				1
R 410	RCE0772	R, Carbon	1/4W	1.8kΩ	±5%				1
R 417	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	1
R 418	RCE0779	R, Carbon	1/4W	6.8kΩ	±5%	1	1	1	1
R 420	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1	1	1	1
R 425	RCE0745	R, Carbon	1/4W	10Ω	±5%	1	1	1	1
R 430	RCE0757	R, Carbon	1/4W	100Ω	±5%	1	1	1	1
R 432	RCE0767	R, Carbon	1/4W	680Ω	±5%	1	1	1	1
R 433	RCE0768	R, Carbon	1/4W	820Ω	±5%				1
R 433	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	
R 434	RCE0689	R, Carbon	1/2W	47Ω	±5%	1	1	1	1
R 435	RCE0774	R, Carbon	1/4W	2.7kΩ	±5%	1	1	1	1
R 436	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%	1	1	1	1
R 437	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%	1	1	1	1
R 438	RCE0789	R, Carbon	1/4W	47kΩ	±5%	1	1	1	1
R 439	RCE0789	R, Carbon	1/4W	47kΩ	±5%	1	1	1	1
R 441	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	1
R 443	RCE0769	R, Carbon	1/4W	47kΩ	±5%	1	1	1	1
R 444	RCE0771	R, Carbon	1/4W	1.5kΩ	±5%	1	1	1	1
R 445	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	1
R 450	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	1
R 452	RCE0785	R, Carbon	1/4W	22kΩ	±5%	1	1	1	1
R 460	RCE0745	R, Carbon	1/4W	10Ω	±5%	1	1	1	
R 460	RCE0749	R, Carbon	1/4W	22Ω	±5%				1
R 470	RCE0800	R, Carbon	1/4W	470kΩ	±5%	1			
R 471	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1			
R 472	RCE0777	R, Carbon	1/4W	1.5kΩ	±5%	1			
R 473	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1			
C 402	CCD0279	C, Ceramic	500V	22pF	±5%	1	1	1	1
C 403	CQX0068	C, Plastic	400V	0.047μF	±10%	1	1	1	1
C 404	CCC1029	C, Ceramic	50V	1000pF	+80 -20%	1	1	1	1
C 405	CQA0101	C, Plastic	50V	47000pF	±10%	1	1	1	1
C 407	CCC0999	C, Ceramic	50V	5pF	±0.25pF	1	1	1	1
C 408	CES0028	C, AL Elyc	10V	47μF	±20%	1	1	1	1
C 417	CEC0176	C, AL Elyc	25V	10μF	±20%	1	1	1	1
C 418	CCC1030	C, Ceramic	50V	1000pF	+80 -20%	1	1	1	1
C 425	CES0028	C, AL Elyc	10V	47μF	±20%	1	1	1	1
C 442	CEX0230	C, AL Elyc	50V	1BP	+80 -20%	1	1	1	1
C 444	CES0028	C, AL Elyc	10V	47μF	±20%	1	1	1	1
C 452	CQA0097	C, Plastic	50V	10000pF	±10%	1	1	1	1
C 460	CES0028	C, AL Elyc	10V	47μF	±20%	1	1	1	1
C 470	CCC1030	C, Ceramic	50V	10000pF	+80 -20%	1			
RV 418	RDE0003	VR, Carbon	EVH-YK3325B14			1	1	1	1
RV 420	RNE0051	VR, Metal	EVN39C00YB14 (10K)			1	1	1	1
RV 473	RNE0047	VR, Metal	EVN39C00&B54 (50K)			1			
TR 401	HTK0099	Transistor	2SK404E			1	1	1	1
TR 402	HTC0148	Transistor	2SC458C						1
TR 431	HTC0168	Transistor	2SC535C			1	1	1	1

Symbol	Part Code	Description		Q'ty A	B	C	D
TR 432	HTC0168	Transistor	2SC535C	1	1	1	1
TR 441	HTA0224	Transistor	2SA1029D	1	1	1	1
TR 470	HTK0099	Transistor	2SK404E	1			
L 432	TLE0111	Coil	E1E-V 6R8KA				1
IC 401	IDH0402	Digital IC	HD74S00				1
IC 401	IDH0467	Digital IC	HD74LS00P	1	1		
S 401		SW Lever	SLR024	1	1	1	1
S 403		SW Lever	SLR024	1	1	1	1
D 401	HDS0437	Diode	1SS133	1	1	1	1
D 444	HDS0437	Diode	1SS133	1	1	1	1

PANEL and OTHERS

Symbol	Part Code	Description		Q'ty A	B	C	D
J 403	JHB0088	CON. Coax	BNC071	1	1	1	1

⑤ SWEEP GEN

Symbol	Part Code	Description	Q'ty A	B	C	D
R 501	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	1
R 502	RCE0769	R, Carbon 1/4W 1kΩ ±5%	1	1	1	1
R 503	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1	1	1	1
R 504	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1	1	1	1
R 505	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	1
R 506	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1	1	1	1
R 507	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1	1	1	1
R 508	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	
R 509	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1	1	1	1
R 510	RCE0753	R, Carbon 1/4W 47Ω ±5%	1	1	1	1
R 513	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1	1	1	1
R 514	RCE0771	R, Carbon 1/4W 1.5kΩ ±5%	1	1	1	1
R 515	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1	1	1	1
R 519	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1	1	1	1
R 520	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1	1	1	1
R 521	RCE0789	R, Carbon 1/4W 47kΩ ±5%	1	1	1	1
R 522	RCE0762	R, Carbon 1/4W 270Ω ±5%	1	1	1	1
R 523	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1	1	1	1
R 524	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1	1	1	
R 524	RCE0789	R, Carbon 1/4W 47kΩ ±5%				1
R 525	RCE0753	R, Carbon 1/4W 47Ω ±5%	1	1	1	1
R 526	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1	1	1	1
R 529	RCE0757	R, Carbon 1/4W 100Ω ±5%	1	1	1	1
R 530	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	1
R 531	RME1174	R, Metal 1/4W 2.00kΩ ±1%	1	1	1	1
R 532	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	1
R 533	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%	1	1	1	
R 533	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%				1
R 534	RCE0785	R, Carbon 1/4W 22kΩ ±5%	1	1	1	1
R 535	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1	1	1	1
R 536	RCE0774	R, Carbon 1/4W 2.7kΩ ±5%	1	1	1	
R 536	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%				1
R 537	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%			1	1
R 538	RCE0783	R, Carbon 1/4W 15kΩ ±5%			1	1
RM 520	3173847	R, Block FOR TIMING	1	1	1	1
C 501	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1	1	1	1
C 525	CCC1133	C, Ceramic 50V 1pF ±0.25pF	1	1	1	1
C 508	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1	1	1	1
C 510	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1	1	1	1
C 511	CES0036	C, AL Elyc 25V 22μF ±20%	1	1	1	1
C 519	CES0028	C, AL Elyc 10V 47μF ±20%	1	1	1	1
C 520	CCC1032	C, Ceramic 50V 82pF ±5%	1	1	1	1
C 524	CCC1001	C, Ceramic 50V 8pF ±0.5pF	1	1	1	1
C 525	CQE0049	C, Plastic ECQ-E1105JN(JNB)Type	1	1	1	1
C 526	CQR0048	C, Plastic ECQ-E1103JN (JNB)	1	1	1	1
C 527	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1	1	1	1
C 528	CES0028	C, AL Elyc 10V 47μF ±20%	1	1	1	1
C 530	CCC1025	C, Ceramic 50V 100pF ±10%	1	1	1	1
C 538	CCC1014	C, Ceramic 50V 47pF ±5%			1	
C 538	CCC1011	C, Ceramic 50V 33pF ±5%				1
CV 520	CVE0049	C, Variable ECR-HA040E11	1	1	1	1
TR 503	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 514	HTC0148	Transistor 2SC458C	1	1	1	1
TR 520	HTK0081	Transistor 2SK304E	1	1	1	1
TR 521	HTC0148	Transistor 2SC458C	1	1	1	1
TR 522	HTC0148	Transistor 2SC458C	1	1	1	1
TR 532	HTC0148	Transistor 2SC458C	1	1	1	1

Symbol	Part Code	Description	Q'ty A	B	C	D
IC 501	IDH0586	Digital, IC HD74LS74AP	1	1	1	
IC 501	IDH0428	Digital, IC HD74S74				1
IC 502	IDH0469	Digital, IC HD74LS03P	1	1	1	1
D 501	HDS0437	Diode 1SS133	1	1	1	1
D 520	HDM0051	Diode MA161	1	1	1	1
D 521	HDM0051	Diode MA161	1	1	1	1
D 522	HDM0051	Diode MA161	1	1	1	1
D 530	HDS0437	Diode 1SS133	1	1	1	1
D 535	HDM0051	Diode MA161	1	1	1	1
D 536	HDS0437	Diode 1SS133	1	1	1	1
R 527	RSE0434	R, Solid 1/4W 10MΩ ±5%	1	1	1	1
R 528	RCE0936	R, Carbon 1/2W 1.5MΩ ±5%	1	1	1	1

HORIZONTAL DISPLAY CKT

Symbol	Part Code	Description	Q'ty A	B	C	D
R 540	RCE0766	R, Carbon 1/4W 560Ω ±5%	1	1	1	1
R 541	RCE0764	R, Carbon 1/4W 390Ω ±5%	1	1	1	1
R 542	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1	1	1	1
R 543	RCE0769	R, Carbon 1/4W 1kΩ ±5%			1	1
R 544	RCE0783	R, Carbon 1/4W 15kΩ ±5%	1	1	1	1
R 545	RCE0780	R, Carbon 1/4W 8.2kΩ ±5%	1	1	1	1
R 546	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%	1	1	1	1
R 547	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	1
R 548	RCE0778	R, Carbon 1/4W 5.6kΩ ±5%	1	1	1	1
R 549	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1	1	1	1
R 550	RCE0778	R, Carbon 1/4W 5.6kΩ ±5%	1	1	1	1
R 551	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%	1	1	1	1
R 552	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	1
R 553	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1	1	1	1
R 554	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	1
R 555	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	1
R 556	RCE0767	R, Carbon 1/4W 680Ω ±5%	1	1	1	1
C 544	CQA0097	C, Plastic 50V 10000pF ±10%	1	1	1	1
C 545	CET0031	C, AL Elyc 50V 1μF	1	1	1	1
C 550	CCC1014	C, Ceramic 50V 47pF ±5%	1	1	1	1
C 551	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1	1	1	1
C 552	CCC1030	C, Ceramic 50V 10000pF +80% -20%	1	1	1	1
C 553	CES0028	C, AL Elyc 10V 47μF ±10%	1	1	1	1
C 554	CES0028	C, AL Elyc 10V 47μF ±10%	1	1	1	1
RV 540	8397021	VR, Carbon V16L5(7x6.5)20KC-B2k		1	1	1
RV 540	840074	VR, Carbon V16L420KC-B2k+B100k	1			
RV 542	RNE0052	VR, Metal 39C00YB23 (2K)	1	1	1	1
RV 550	RNE0058	VR, Metal 39C00YB13 (1K)	1	1	1	1
TR 544	HTC0148	Transistor 2SC458C	1	1	1	1
TR 545	HTC0148	Transistor 2SC458C	1	1	1	1
IC 550	IDH0802	Digital IC HD14053BP	1	1	1	1
D 541	HDS0437	Diode 1SS133	1	1	1	1
D 543	HDS0407	Diode SR503D with mount(red)			1	1

CHOP PULSE GENERATOR

Symbol	Part Code	Description	Q'ty A	B	C	D
R 571	RCE0769	R, Carbon 1/4W 1kΩ ±5%		1	1	1
R 572	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%		1	1	1
R 573	RCE0765	R, Carbon 1/4W 470Ω ±5%		1	1	1
R 574	RCE0783	R, Carbon 1/4W 15kΩ ±5%		1	1	1
R 576	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	1
R 578	RCE0776	R, Carbon 1/4W 3.9kΩ ±5%		1	1	1
C 571	CCC1030	C, Ceramic 50V 10000pF +80 -20%		1	1	1
C 572	CCC1014	C, Ceramic 50V 47pF ±5%		1	1	1
C 573	CCC1027	C, Ceramic 50V 220pF ±10%		1	1	1
C 575	CCC1027	C, Ceramic 50V 220pF ±10%		1	1	1
C 576	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1	1	1	1
IC 571	IDH0646	Digital, IC HD74LS02P	1	1	1	1
L 537	TLE0138	Coil ELE-V 681KA			1	
L 537	TLE0092	Coil ELE-V 331KA				1
L 571	TLE0128	Coil ELE-V 330KA		1	1	1
D 571	HDS0437	Diode 1SS133		1	1	1
D 572	HDS0437	Diode 1SS133		1	1	1
D 573	HDS0437	Diode 1SS133		1	1	1
D 574	HDS0437	Diode 1SS133		1	1	1

⑥ H AMP

Symbol	Part Code	Description	Q'ty A	B	C	D
R 801	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%	1	1	1	1
R 802	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	1
R 804	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1	1	1	1
R 805	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	1
R 806	RCE0753	R, Carbon 1/4W 47Ω ±5%	1	1	1	1
R 807	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	1
R 811	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1	1	1	1
R 812	RME1076	R, Metal 1/4W 2.21kΩ ±1%	1	1	1	1
R 813	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1	1	1	1
R 814	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%	1	1	1	1
R 821	RME1095	R, Metal 1/4W 82.5kΩ ±1%	1	1		
R 821	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%			1	
R 821	RCE0769	R, Carbon 1/4W 1kΩ ±5%				1
R 822	RME1095	R, Metal 1/4W 82.5kΩ ±1%	1	1		
R 822	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%			1	
R 822	RCE0769	R, Carbon 1/4W 1kΩ ±5%				1
R 823	RCE0745	R, Carbon 1/4W 10Ω ±5%	1	1	1	1
R 824	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1		
R 824	RCE0779	R, Carbon 1/4W 6.8kΩ ±5%			1	
R 824	RCE0774	R, Carbon 1/4W 2.7kΩ ±5%				1
R 831	RCE0762	R, Carbon 1/4W 270Ω ±5%			1	
R 831	RCE0757	R, Carbon 1/4W 100Ω ±5%				1
R 832	RCE0749	R, Carbon 1/4W 22Ω ±5%	1	1	1	1
R 833	RME1195	R, Metal 1/4W 110kΩ ±1%	1	1		
R 833	RME1076	R, Metal 1/4W 2.21kΩ ±1%			1	
R 833	RME1073	R, Metal 1/4W 1.21kΩ ±1%				1
R 834	RME1195	R, Metal 1/4W 110kΩ ±1%	1	1		
R 834	RME1076	R, Metal 1/4W 2.21kΩ ±1%			1	
R 834	RME1073	R, Metal 1/4W 1.21kΩ ±1%				1
R 840	RCE0765	R, Carbon 1/4W 470Ω ±5%	1	1	1	
R 840	RCE0761	R, Carbon 1/4W 100Ω ±5%				1
R 841	RME1079	R, Metal 1/4W 3.92kΩ ±1%	1	1	1	
R 841	RME1074	R, Metal 1/4W 1.50kΩ ±1%				1
R 842	RME1079	R, Metal 1/4W 3.92kΩ ±1%	1	1	1	
R 842	RME1074	R, Metal 1/4W 1.50kΩ ±1%				1
R 843	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	
R 843	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%				1
R 844	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	
R 844	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%				1
R 845	RMR3779	R, Metal 1/4W 100kΩ ±1%	1	1	1	
R 845	RMR3726	R, Carbon 1W 22kΩ ±1%				1
R 846	RMR3779	R, Metal 1/4W 100kΩ ±1%	1	1	1	
R 846	RMR3726	R, Carbon 1W 22kΩ ±1%				1
R 847	RCE0757	R, Carbon 1/4W 100Ω ±5%	1	1		
R 847	RCE0755	R, Carbon 1/4W 68Ω ±5%			1	1
R 851	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1	1	1	
R 851	RCE0714	R, Carbon 1/2W 5.6kΩ ±5%				1
R 852	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1	1	1	
R 852	RCE0714	R, Carbon 1/2W 5.6kΩ ±5%				1
R 853	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1	1	1	
R 853	RCE0714	R, Carbon 1/2W 5.6kΩ ±5%				1
R 854	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1	1	1	
R 854	RCE0714	R, Carbon 1/2W 5.6kΩ ±5%				1
R 855	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1	1	1	
R 855	RCE0714	R, Carbon 1/2W 5.6kΩ ±5%				1
R 856	RCE0721	R, Carbon 1/2W 22kΩ ±5%	1	1	1	
R 856	RCE0714	R, Carbon 1/2W 5.6kΩ ±5%				1
R 857	RCE0763	R, Carbon 1/4W 330Ω ±1%	1	1	1	1
R 858	RCE0763	R, Carbon 1/4W 330Ω ±5%	1	1	1	1
R 859	RZZ0032	R, Fusing PF-25S 470Ω	1	1	1	
R 859	RZZ0031	R, Fusing PF-25S 220Ω				1
R 867	RCE0779	R, Carbon 1/4W 10kΩ ±5%	1	1		
R 868	RCE0778	R, Carbon 1/4W 8.2kΩ ±5%	1	1		

Symbol	Part Code	Description	Q'ty A	B	C	D
R 871	RCE0757	R, Carbon 1/4W 100Ω ±5%	1	1	1	1
R 872	RCE0757	R, Carbon 1/4W 100Ω ±5%	1	1	1	1
R 873	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	1
R 874	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	1
R 880	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	1
R 881	RCE0761	R, Carbon 1/4W 220Ω ±5%	1	1	1	1
C 801	CES0028	C, AL Elyc 10V 47μF ±10%	1	1	1	1
C 805	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1	1	1	1
C 806	CES0028	C, AL Elyc 10V 47μF ±10%	1	1	1	1
C 808	CES0028	C, AL Elyc 10V 47μF ±10%	1	1	1	1
C 811	CCC1002	C, Ceramic 50V 10pF ±0.5pF	1	1	1	
C 811	CCC0996	C, Ceramic 50V 2pF ±0.25pF				1
C 812	CCC1002	C, Ceramic 50V 10pF ±0.5pF	1	1	1	
C 812	CCC0996	C, Ceramic 50V 2pF ±0.25pF				1
C 832	CCC1007	C, Ceramic 50V 22pF ±5%	1	1	1	1
C 840	CCC1002	C, Ceramic 50V 10pF ±0.5pF				1
C 845	CCD0273	C, Ceramic 500V 2pF ±0.25pF	1	1	1	1
C 846	CCD0273	C, Ceramic 500V 2pF ±0.25pF	1	1	1	1
C 847	CCC1007	C, Ceramic 50V 22pF ±5%	1	1	1	1
C 848	CCC1007	C, Ceramic 50V 22pF ±5%	1	1	1	1
C 857	CCD0287	C, Ceramic 500V 4700pF +100 -0%	1	1	1	1
C 861	CCC1030	C, Ceramic 50V 10000pF +80 -20%			1	1
C 873	CCC1025	C, Ceramic 50V 100pF ±10%	1	1	1	1
C 874	CCC1025	C, Ceramic 50V 100pF ±10%	1	1	1	1
C 823	CCC1004	C, Ceramic 50V 15pF ±5%	1	1	1	1
C 880	CCC1030	C, Ceramic 50V 10000pF +80 -20%	1	1	1	1
RV 805	RDE0003	VR, Carbon EVH-YK3325B14	1	1	1	1
RV 821	RNE0047	VR, Metal EVN39C00YB54 (50K)	1	1		
RV 821	RNE0052	VR, Metal EVN39C00YB23 (2K)			1	
RV 821	RNE0050	VR, Metal EVN39C00YB52 (500)				1
RV 824	RNE0052	VR, Metal EVN39C00YB23 (2K)	1	1		
RV 824	RNE0051	VR, Metal EVN39C00YB14 (10K)			1	1
RV 831	RNE0050	VR, Metal EVN39C00YB52 (500)	1	1	1	
RV 831	RNE0048	VR, Metal EVN39C00YB22 (200)				1
CV 840	CVE0049	C, Variable ECR-HA040E11	1	1	1	1
TR 811	HTC0148	Transistor 2SC458C	1	1	1	1
TR 812	HTC0148	Transistor 2SC458C	1	1	1	1
TR 821	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 822	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 831	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 832	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 843	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 844	HTA0224	Transistor 2SA1029D	1	1	1	1
TR 851	HTC0649	Transistor 2SC2610	1	1	1	
TR 851	HTC0722	Transistor 2SC2909S				1
TR 852	HTC0649	Transistor 2SC2610	1	1	1	
TR 852	HTC0722	Transistor 2SC2909S				1
TR 853	HTC0649	Transistor 2SC2610	1	1	1	
TR 853	HTC0722	Transistor 2SC2909S				1
TR 854	HTC0649	Transistor 2SC2610	1	1	1	
TR 854	HTC0722	Transistor 2SC2909S				1
L 852	TLE0138	Coil ELE-V 681KA				1
L 852	TLE0148	Coil FL-7H 682J	1	1	1	
S 501	8394003	SW, Rotary	1	1	1	1
VS 502	8376780	SW PB SPJ222N			1	1

Symbol	Part Code	Description	Q'ty			
			A	B	C	D
D 851	HDS0437	Diode 1SS133	1	1	1	1
D 852	HDS0437	Diode 1SS133	1	1	1	1
D 853	HDS0437	Diode 1SS133	1	1	1	1
D 854	HDS0437	Diode 1SS133	1	1	1	1

ALT MAG SWITCHING

Symbol	Part Code	Description	Q'ty			
			A	B	C	D
R 860	RCE0770	R, Carbon 1/4W 1.2kΩ ±5%				1
R 860	RME1192	R, Metal 1/4W 24.3kΩ ±1%			1	
R 861	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%			1	1
R 862	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%			1	1
R 863	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%			1	1
R 864	RCE0765	R, Carbon 1/4W 470Ω ±5%			1	1
R 865	RCE0765	R, Carbon 1/4W 470Ω ±5%			1	1
R 866	RME1085	R, Metal 1/4W 12.1kΩ ±1%				1
R 861	RME1090	R, Metal 1/4W 33.2kΩ ±1%			1	
R 869	RCE0745	R, Carbon 1/4W 10Ω ±5%			1	1
TR 860	HTA0224	Transistor 2SA1029D			1	1
TR 861	HTA0224	Transistor 2SA1029D			1	1
IC 801	IDH0586	Digital IC HD74LS74AP			1	1

⑦ HV Z AMP

HIGH VOLTAGE CKT

Symbol	Part Code	Description				Q'ty A	B	C	D
R 1001	RMS0023	R, Metal	1/4W	1.43MΩ	±0.5%	1	1	1	
R 1001	RMS0018	R, Metal	1/4W	1MΩ	±1%				1
R 1002	RCE0789	R, Carbon	1/4W	47kΩ	±5%	1	1	1	1
R 1003	RCE0797	R, Carbon	1/4W	220kΩ	±5%	1	1	1	1
R 1004	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	1
R 1005	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R 1005	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%				1
R 1006	RCE0757	R, Carbon	1/4W	100Ω	±5%	1	1	1	1
R 1012	RCE0789	R, Carbon	1/4W	47kΩ	±5%				1
R 1014	RCE0715	R, Carbon	1/2W	6.8kΩ	±5%	1	1	1	1
R 1017	RMV0004	R, Metal	1/2W	22.1MΩ	±1%	1	1	1	1
R 1016	RCE0800	R, Carbon	1/4W	470kΩ	±5%	1	1	1	
R 1016	RCE0745	R, Carbon	1/4W	10Ω	±5%				1
R 1020	RCE0798	R, Carbon	1/4W	330kΩ	±5%	1	1	1	1
R 1021	RCE0785	R, Carbon	1/4W	22kΩ	±5%	1	1	1	
R 1021	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%				1
R 1023	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	1
R 1024	RSE0434	R, Solid	ERC14G	10MΩ		1	1	1	1
R 1033	RCE0781	R, Carbon	1/4W	10kΩ	±5%				1
R 1034	RCE0785	R, Carbon	1/4W	22kΩ	±5%				1
R 1038	RCE0793	R, Carbon	1/4W	100kΩ	±5%				1
R 1038	RCE0798	R, Carbon	1/4W	330kΩ	±5%	1	1	1	1
R 1350	RCE0749	R, Carbon	1/4W	22Ω	±5%	1	1	1	1
C 1001	CQA0099	C, Plastic	50V	0.022μF	±10%	1	1	1	1
C 1002	CES0035	C, AL Elyc	50V	47μF	±10%	1	1	1	1
C 1005	CQA0101	C, Plastic	50V	0.047μF	±10%	1	1	1	1
C 1012	CCD0231	C, Ceramic	2000V	4700pF	+80 -20%	1	1	1	1
C 1013	CCD0231	C, Ceramic	2000V	4700pF	+80 -20%	1	1	1	1
C 1014	CCD0231	C, Ceramic	2000V	4700pF	+80 -20%	1	1	1	1
C 1016	CCD0245	C, Ceramic	2000V	100pF	±10%	1	1	1	1
C 1020	CCD0286	C, Ceramic	500V	1000pF	+100 -0%	1	1	1	1
C 1021	CEC0213	C, AL Elyc	160V	1μF		1	1	1	1
C 1023	CCD0246	C, Ceramic	2kV	1000pF	±10%	1	1	1	1
C 1025	CCD0231	C, Ceramic	2000V	4700pF	+80 -20%	1	1	1	1
C 1034	CCD0287	C, Ceramic	500V	4700pF	+100 -0%				1
C 1035	CCD0287	C, Ceramic	500V	4700pF	+100 -0%	1	1	1	1
C 1038	CCD0287	C, Ceramic	500V	4700pF	+100 -0%	1	1	1	1
RV 1021	RNE0054	VR, Metal	EVN39C00YB15 (100K)			1	1	1	1
RV 1033	RNE0054	VR, Metal	EVN39C00YB15 (100K)						1
RV 1035	RNE0055	VR, Metal	EVN39C00YB25 (200K)			1	1	1	
RV 1035	RNE0054	VR, Metal	EVN39C00YB15 (100K)						1
RV 1348	8348450	VR, Metal	CR29R	22kΩ		1	1	1	1
TR 1001	HIK0081	Transistor	2SK304E			1	1	1	1
TR 1002	HTA0224	Transistor	2SA1029D			1	1	1	1
TR 1006	HTD0155	Transistor	2SD313E			1	1	1	1
	HYX0010		30F-TO-220			1	1	1	1
TR 1348	HTC0148	Transistor	2SC458C			1	1	1	1
TR 1349	HTA0224	Transistor	2SA1029D			1	1	1	1
D 1012	HDY0031	Diode	Y10GA			1	1	1	
D 1013	HDY0031	Diode	Y10GA						1
D 1020	HDH0072	Diode	HZ22						1
D 1021	HDS0250	Diode	1SS83			1	1	1	1
D 1022	HDS0250	Diode	1SS83			1	1	1	1
D 1023	HDS0250	Diode	1SS83			1	1	1	1
D 1024	HDS0250	Diode	1SS83			1	1	1	1
D 1038	HDH0072	Diode	HZ22			1	1	1	1

Symbol	Part Code	Description		Q'ty A	B	C	D
T 1001	3180008	NFMR	FOR V-211,212, 22, 422	1	1	1	
F 1001		Fuse	TSCR UL 125V 0.25A	1	1	1	
MULT1001	3180009	Multiplier	10KV X5				1
NL 1024	ELL0019	Lamps	NE-2	1	1	1	
NL 1025	ELL0019	Lamps	NE-2	1	1	1	1
F 1001	ELL0147	Fuse	TSCR UL 125V 0.5A				

PANEL and OTHERS

Symbol	Part Code	Description		Q'ty A	B	C	D
V 1001	DPX0076	CRT	150BTB31 (IG)	1	1	1	
V 1001	DPX0077	CRT	2977B31				1
	8338351	Terminal	Z-048	1	1	1	1
J 9	JHB0088	CON. Coax	BNC071	1	1	1	1
L 1350		Coil	Trace Rotation	1	1	1	1

Z AXIS AMP

Symbol	Part Code	Description				Q'ty A	B	C	D
R 901	RCE0789	R, Carbon	1/4W	47kΩ	±5%	1	1	1	
R 901	RCE0787	R, Carbon	1/4W	33kΩ	±5%				1
R 902	RCE0776	R, Carbon	1/4W	3.9kΩ	±5%	1	1	1	1
R 903	RCE0784	R, Carbon	1/4W	18kΩ	±5%				1
R 903	RCE0779	R, Carbon	1/4W	6.8kΩ	±5%	1	1	1	
R 904	RCE0725	R, Carbon	1/2W	47kΩ	±5%	1	1	1	
R 904	RCE0723	R, Carbon	1/2W	33kΩ	±5%				1
R 906	RCE0793	R, Carbon	1/4W	100kΩ	±5%				1
R 906	RCE0793	R, Carbon	1/4W	100kΩ	±5%	1	1	1	
R 907	RCE0757	R, Carbon	1/4W	100Ω	±5%	1	1	1	1
R 908	RCE0771	R, Carbon	1/4W	1.5kΩ	±5%				1
R 908	RCE0773	R, Carbon	1/4W	2.2kΩ	±5%	1	1	1	
R 909	RCE0798	R, Carbon	1/4W	330kΩ	±5%	1	1	1	
R 909	RCE0797	R, Carbon	1/4W	220kΩ	±5%				1
R 910	RCE0783	R, Carbon	1/4W	15kΩ	±5%				1
R 910	RCE0793	R, Carbon	1/4W	100kΩ	±5%	1	1	1	
R 911	RCE0781	R, Carbon	1/4W	10kΩ	±5%	1	1	1	
R 911	RCE0769	R, Carbon	1/4W	1kΩ	±5%				1
R 912	RCE0745	R, Carbon	1/4W	10Ω	±5%	1	1	1	
R 912	RCE0745	R, Carbon	1/4W	10Ω	±5%				1
R 915	RCE0761	R, Carbon	1/4W	220Ω	±5%	1	1	1	1
R 930	RCE0776	R, Carbon	1/4W	3.9kΩ	±5%				1
R 930	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R 931	RCE0787	R, Carbon	1/4W	33kΩ	±5%			1	1
R 905	RCE0795	R, Carbon	1/4W	150kΩ	±5%				1

Symbol	Part Code	Description	Q'ty A	B	C	D
C 901	CES0028	C, AL Elyc 10V 47μF ±10%	1	1	1	1
C 904	CCD0272	C, Ceramic 500V 1 pF ±0.25pF	1	1	1	1
C 908	CCD0287	C, Ceramic 500V 4700 pF +100% -0%	1	1	1	1
C 912	CET0033	TC 04SM 160V 1μ	1	1	1	1
TR 901	HTC0192	Transistor 2SC641K-C	1	1	1	1
TR 906	HTC0148	Transistor 2SC458C	1	1	1	1
TR 910	HTA0277	Transistor 2SA1207S	1	1	1	1
TR 912	HTC0722	Transistor 2SC2909S	1	1	1	1
TR 931	HTA0104	Transistor 2SA778AK			1	1
D 901	HDS0437	Diode 1SS133	1	1	1	1
D 902	HDS0437	Diode 1SS133	1	1	1	1
D 910	HDS0437	Diode 1SS133	1	1	1	1

CRT

Symbol	Part Code	Description	Q'ty A	B	C	D
R 1018	RCE0738	R, Carbon 1/2W 2.2MΩ ±5%	1	1	1	
R 1030	RCE0781	R, Carbon 1/4W 10kΩ ±5%	1	1	1	
R 1031	RCE0793	R, Carbon 1/4W 100kΩ ±5%	1	1	1	
J 1001	8390152	Socket 1339 (CRT)	1	1	1	
PEF-626		PCB PB-14	R	R	R	

CRT

Symbol	Part Code	Description	Q'ty A	B	C	D
R 1018	RCE0738	R, Carbon 1/2W 2.2MΩ ±5%				1
R 1030	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%				1
R 1031	RCE0793	R, Carbon 1/4W 100kΩ ±5%				1
R 1032	RCE0757	R, Carbon 1/4W 100Ω ±5%				1
J 1001	8390152	Socket 1339 (CRT)				1
PEF-627		PCB PB-14				R

⑧ POWER SUPPLY

Symbol	Part Code	Description				Q'ty A	B	C	D
R 1101	RCE0793	R, Carbon	1/4W	100kΩ	±5%	1	1	1	1
R 1102	RCE0769	R, Carbon	1/4W	1.0kΩ	±5%	1	1	1	1
R 1103	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%	1	1	1	
R 1103	RCE0774	R, Carbon	1/4W	2.7kΩ	±5%				1
R 1104	RME1096	R, Metal	1/4W	100kΩ	±1%	1	1	1	
R 1104	RME1091	R, Metal	1/4W	39.2kΩ	±5%				1
R 1105	RCE0777	R, Carbon	1/4W	4.7kΩ	±5%	1	1	1	
R 1105	RCE0775	R, Carbon	1/4W	3.3kΩ	±5%				1
R 1106	RME1086	R, Metal	1/4W	15.0kΩ	±1%	1	1	1	
R 1106	RME1084	R, Metal	1/4W	10.0kΩ	±1%				1
R 1107	RCE0785	R, Carbon	1/4W	22kΩ	±5%	1	1	1	1
R 1109	RCE0769	R, Carbon	1/4W	1kΩ	±5%	1	1	1	1
R 1110	RCE0761	R, Carbon	1/4W	220Ω	±5%	1	1	1	1
R 1110	RCE0767	R, Carbon	1/4W	220Ω	±5%	1	1	1	1
R 1121	RCE0761	R, Carbon	1/4W	220Ω	±5%	1	1	1	1
R 1124	RCE0783	R, Carbon	1/4W	15kΩ	±5%	1	1	1	1
R 1125	RCE0753	R, Carbon	1/4W	47Ω	±5%	1	1	1	1
R 1131	RCE0685	R, Carbon	1/2W	22Ω	±5%	1	1	1	
R 1131	RCE0689	R, Carbon	1/2W	47Ω	±5%				1
R 1132	RCE0689	R, Carbon	1/2W	47Ω	±5%				1
R 1141	RCE0800	R, Carbon	1/4W	470kΩ	±5%	1	1	1	1
R 1142	RCE0787	R, Carbon	1/4W	33kΩ	±5%	1	1	1	1
C 1101	CES0201	C, AL Elyc	160V	47μF		1	1	1	1
C 1102	CES0203	C, AL Elyc	250V	47μF		1	1	1	1
C 1109	CES0201	C, AL Elyc	160V	47μF		1	1	1	1
C 1110	CQA0092	C, Plastic	50V	0.0015μF		1	1	1	1
C 1111	CES0204	C, AL Elyc	25V	2200μF		1	1	1	1
C 1112	CES0028	C, AL Elyc	10V	47μF/LB		1	1	1	1
C 1121	CES0204	C, AL Elyc	25V	2200μF		1	1	1	1
C 1121	CES0028	C, AL Elyc	10V	47μF/LB		1	1	1	1
C 1124	CQA0101	C, Plastic	50V	0.047μF	±10%	1	1	1	1
C 1131	CES0036	C, AL Elyc	25V	22μF/LB		1	1	1	1
C 1138	CES0028	C, AL Elyc	10V	47μF/LB		1	1	1	1
TR 1102	HIC0671	Transistor	2SC1505L			1	1	1	1
TR 1101	HTA0104	Transistor	2SA778AK			1	1	1	1
TR 1103	HTA0224	Transistor	2SA1029D			1	1	1	1
TR 1104	HIC0148	Transistor	2SC458C			1	1	1	1
IC 1111	ILH0109	Digital IC	HA17808P			1	1	1	1
IC 1121	ILM0342	Digital IC	M PC7808			1	1	1	1
IC 1131	ILH0108	Digital IC	HA17805P			1	1	1	1
D 1101	HDS0476	Diode	S5566J			1	1	1	1
D 1102	HDS0476	Diode	S5566J			1	1	1	1
D 1103	HDS0476	Diode	S5566J			1	1	1	1
D 1104	HDS0476	Diode	S5566J			1	1	1	1
D 1105	HDS0476	Diode	S5566J			1	1	1	1
D 1106	HDS0476	Diode	S5566J			1	1	1	1
D 1111	HDS0475	Diode	S5566B			1	1	1	1
D 1112	HDS0475	Diode	S5566B			1	1	1	1
D 1113	HDS0475	Diode	S5566B			1	1	1	1
D 1114	HDS0475	Diode	S5566B			1	1	1	1
P 1101	JBX0703	Connector	1-171825-0			1	1	1	1
PEF-621		PCB	PB-15			R	R	R	R

SCALE, ILLUM LAMP

Symbol	Part Code	Description		Q'ty A	B	D
PL 1401	8400068	Lamp	8V		1	1
PL 1402	8400068	Lamp	8V			1
PL 1403	8400068	Lamp	8V			1
PEF-623		PCB	PB-15			R

PANEL and OTHERS

Symbol	Part Code	Description		Q'ty A	B	D
J 1102	JJC0026	Connector	CMJ (C-170)	1	1	1
J 1103	3142147	Unit PWP	S-17221 (100/120/220/240V)	1	1	1
S 1101	8400067	SW, PB	SDV 3P	1	1	1
T 1101	3173880	XFMR	For V-211,212, 222, 422	1	1	1
D 1110	HDS0408	Diode	SR503D with mount(red)	1	1	1
TR 1310	HTD0155	Transistor	2SD313E			1

⑨ RV/LAMP

Symbol	Part Code	Description	Q'ty A	B	C	D
R 932	RCE0737	R, Carbon 1/2W 1.8MΩ ±5%			1	
R 932	RCE0738	R, Carbon 1/2W 2.2MΩ ±5%				1
R 933	RMW0008	R, Metal VR37-15MΩ ±5%	1	1	1	1
R 1019	RCE0793	R, Carbon 1/4W 100kΩ ±5%			1	
R 1019	RCE0798	R, Carbon 1/4W 330kΩ ±5%				1
R 1301	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%				1
R 1301	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%	1	1	1	
R 1310	RCE0777	R, Carbon 1/4W 4.7kΩ ±5%			1	1
R 1311	RCE0775	R, Carbon 1/4W 3.3kΩ ±5%			1	1
R 932	RCE0715	R, Carbon 1/2W 6.8kΩ ±5%	1	1		
R 1019	RCE0800	R, Carbon 1/4W 470kΩ ±5%	1	1		
R 1312	RCE0773	R, Carbon 1/4W 2.2kΩ ±5%			1	1
RV 1301	8348452	VR, Carbon EVH-CCAK20B14	1	1	1	1
RV 1311	8348452	VR, Carbon EVH-CCAK20B14			1	1
RV 1401	RNE0059	VR, Metal EVHNDGK20B26	1	1	1	1
TR 1311	HTA0224	Transistor 2SA1029D			1	1
D 1310	HDS0437	Diode 1SS133			1	1
PEF-625		PCB PB-15			R	R

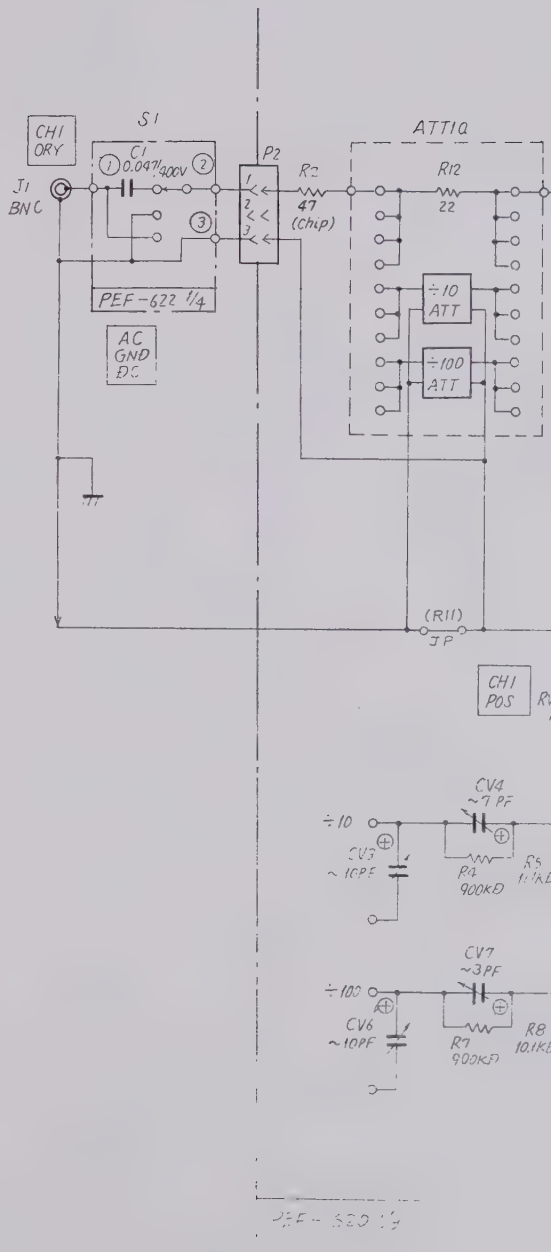
10. SCHEMATIC DIAGRAMS

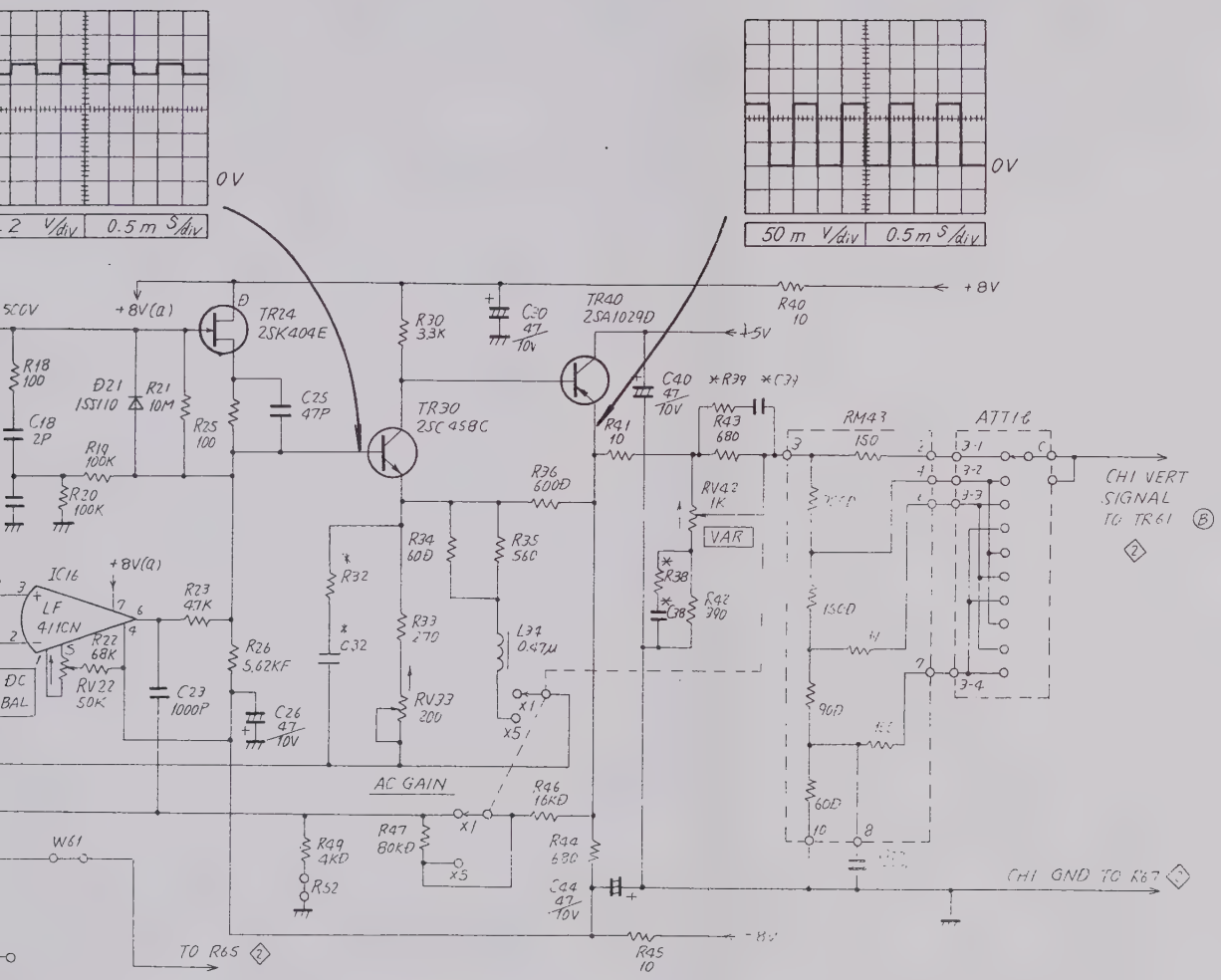
Note

1. This basic circuit diagram is subject to change without notice.
2. All resistor values in ohm: 1/4W and all capacitor values in microfarad unless indicated.
3. * Factory selected values.

DC VOLTAGE MEASUREMENT CONDITIONS

TRIG LEVEL	:	CENTER
AC-GND-DC	:	DC
VOLTS/DIV	:	10 mV
INPUT	:	CH1
TRIG MODE	:	AUTO
TRIG SOURCE	:	INT
INT TRIG	:	CH1
SWEEP TIME	:	0.5 ms
PROBE	:	10 : 1





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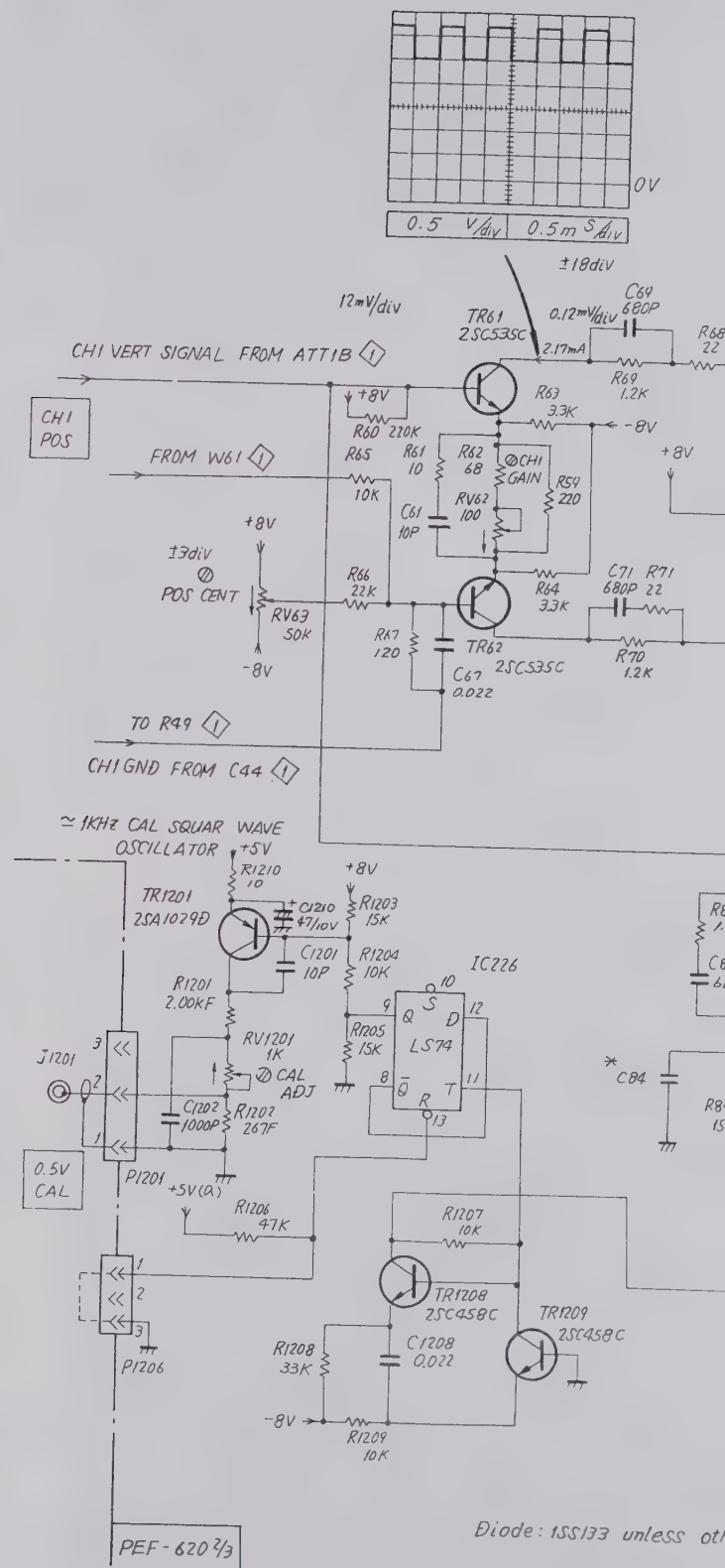
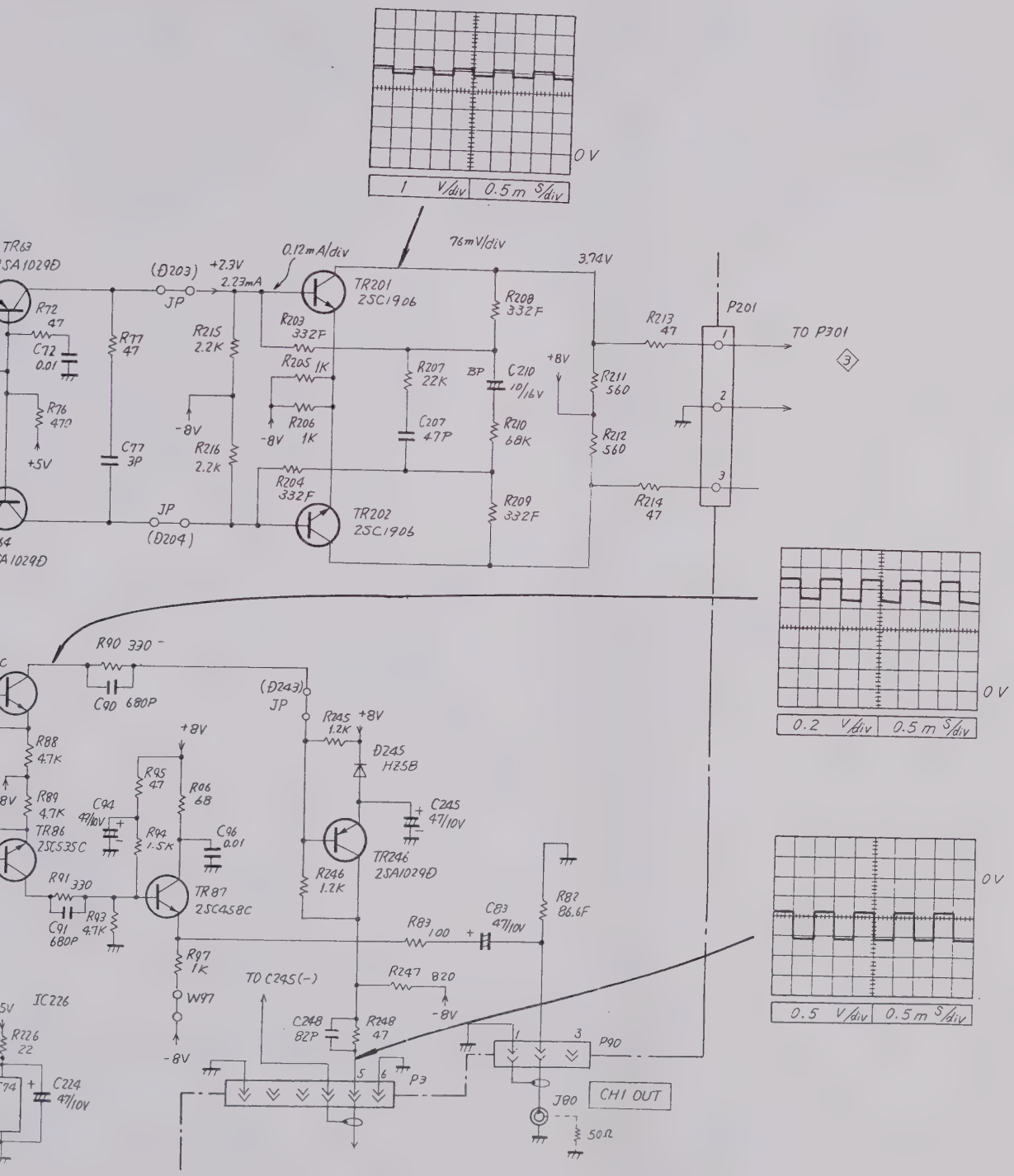
INPUT AMP ①


0V
0.5 V/div
0.5m S/div
±18div
12mV/div
TR61
2SC535C
0.12mV/div
2.17mA
C69
680P
R68
22
R69
1.2K
CH1 VERT SIGNAL FROM ATT1B
CH1
POS
+8V
R60 220K
R63
3.3K
-8V
FROM W61
R65
10K
R61
10
R62
68
CH1
GAIN
RV62
100
R59
220
C61
10P
±3div
POS CENT
RV63
50K
R66
22K
R64
3.3K
C71 R71
680P 22
R67
120
TR62
2SC535C
C67
0.022
R70
1.2K
TO R49
CH1GND FROM C44
≃1KHz CAL SQUAR WAVE
OSCILLATOR
+5V
R1210
10
TR1201
2SA1029D
C1210
47/10V
R1203
15K
C1201
10P
R1204
10K
IC226
R1201
2.00KF
RV1201
1K
CAL
ADJ
R1205
15K
LS74
J1201
C1202
1000P
R1202
267F
0.5V
CAL
P1201
+5V(A)
R1206
47K
R1207
10K
TR1208
2SC458C
TR1209
2SC458C
R1208
33K
C1208
0.022
R1209
10K
P1206
PEF-620 2/3
Diode: 1SS133 unless ot



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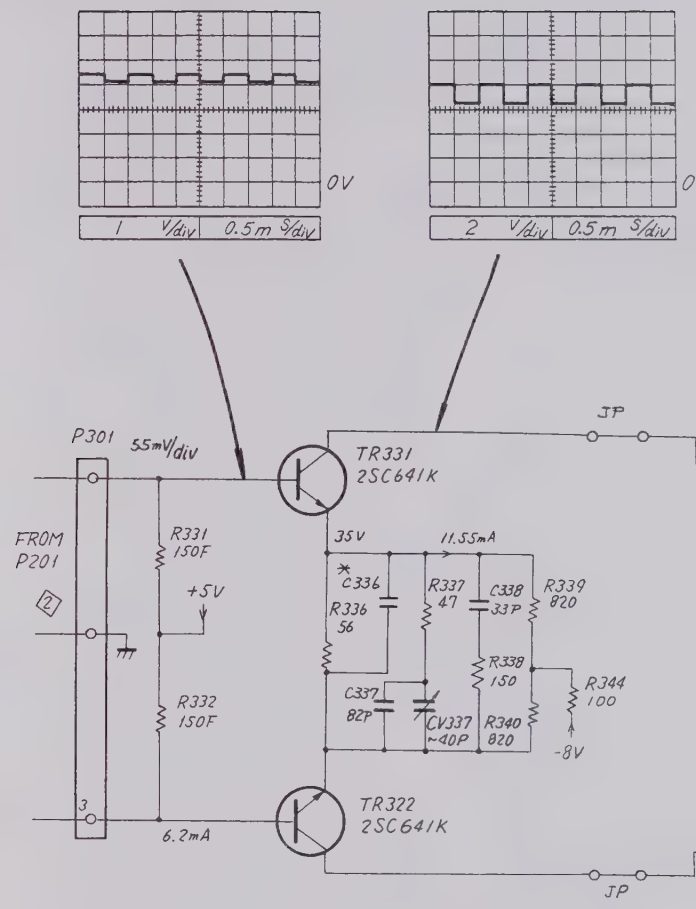
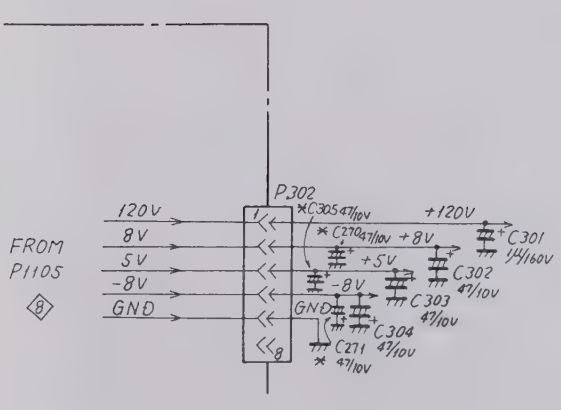
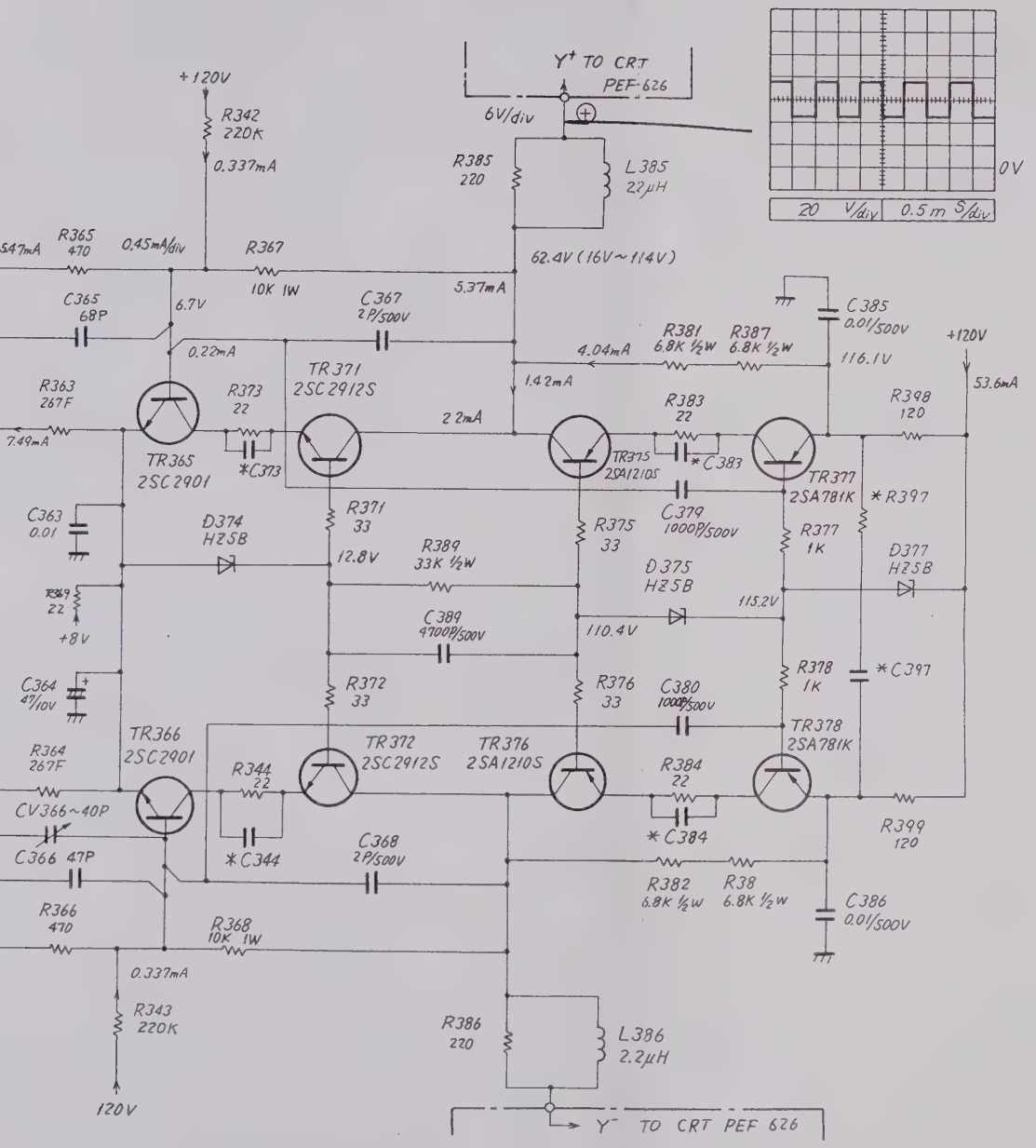
VERT PREAMP TRIG PICKOFF CAL ②

e noticed.


0V
1 V/div 0.5m S/div
2 V/div 0.5m S/div
P301 55mV/div
FROM P201
2
3
R331 150F
+5V
R332 150F
6.2mA
TR331 2SC641K
TR322 2SC641K
35V
11.55mA
C336
R336 56
R337 47
C338 33P
R339 820
R338 150
R344 100
C337 82P
CV337 ~40P
R340 820
-8V
JP
JP


FROM P110S
8
120V
8V
5V
-8V
GND
P302
1
8
C305 47/10V
+120V
C270 47/10V
+8V
+5V
-8V
GND
C271 47/10V
C301 1/4/160V
C302 47/10V
C303 47/10V
C304 47/10V


+120V
R342
220K
0.337mA
Y+ TO CRT
PEF-626
6V/div
R385
220
L385
22μH
0V
20 V/div
0.5m S/div
R365
470
0.45mA/div
R367
10K 1W
62.4V (16V~1.14V)
5.37mA
C365
68P
6.7V
C367
2P/500V
0.22mA
C385
0.01/500V
R381
6.8K ½W
R387
6.8K ½W
4.04mA
116.1V
+120V
53.6mA
1.42mA
R363
267F
R373
22
TR371
2SC2912S
2.2mA
R383
22
R398
120
7.49mA
TR365
2SC2901
*C373
TR375
2SA1210S
*C383
TR377
2SA781K
*R397
C363
0.01
D374
HZ5B
R371
33
R375
33
C379
1000P/500V
R377
1K
D377
HZ5B
12.8V
R389
33K ½W
D375
HZ5B
115.2V
R369
22
+8V
C389
4700P/500V
110.4V
C364
47/10V
R372
33
R376
33
C380
1000P/500V
R378
1K
*C397
TR366
2SC2901
TR372
2SC2912S
TR376
2SA1210S
TR378
2SA781K
R364
267F
R344
22
R384
22
CV366~40P
*C384
R399
120
C366
47P
*C344
C368
2P/500V
R382
6.8K ½W
R38
6.8K ½W
C386
0.01/500V
R366
470
R368
10K 1W
0.337mA
R343
220K
R386
220
L386
2.2μH
120V
Y- TO CRT PEF 626

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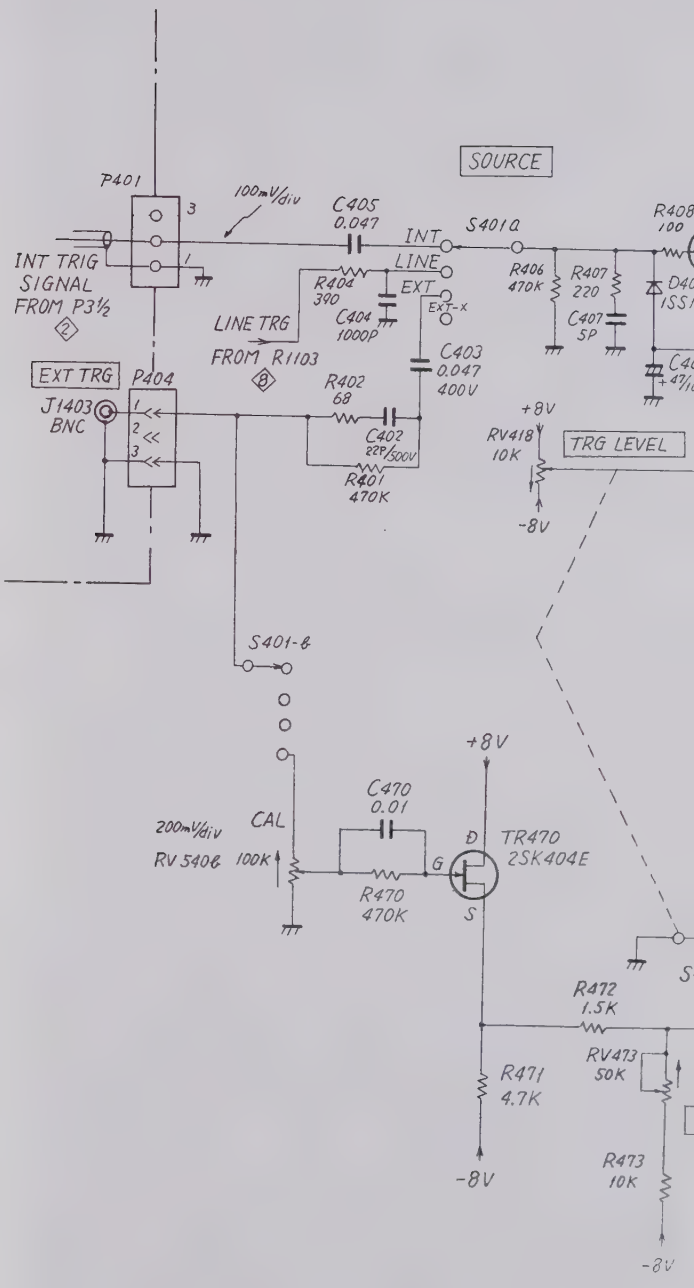
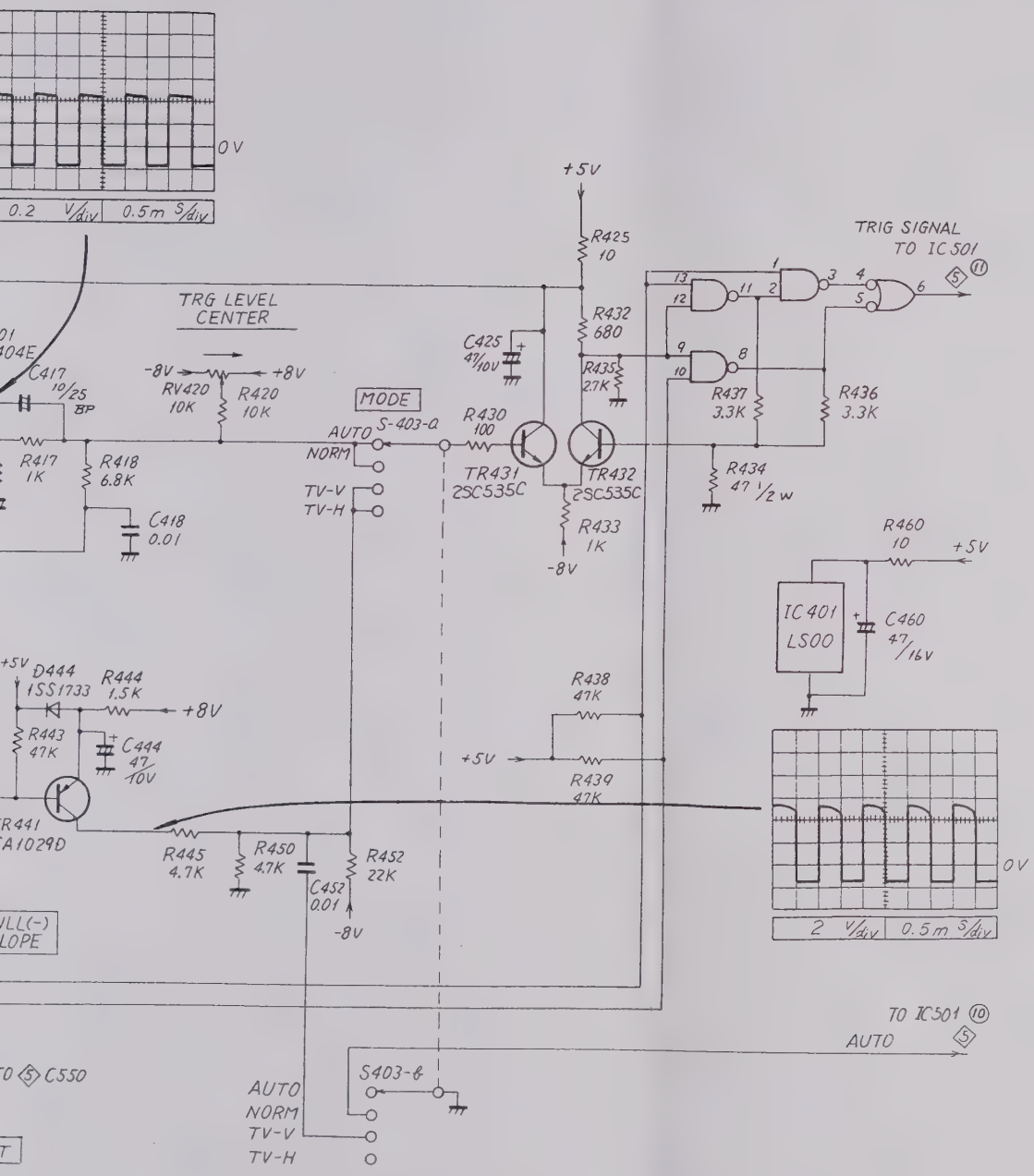
V OUT ◇3


SOURCE
P401
100mV/div
C405
0.047
INT
S401a
INT TRIG
SIGNAL
FROM P3½
LINE
EXT
EXT-x
R404
390
C404
1000P
LINE TRG
FROM R1103
C403
0.047
400V
R406
470K
R407
220
C407
SP
EXT TRG
P404
J1403
BNC
R402
68
C402
22P/500V
R401
470K
+8V
RV418
10K
TRG LEVEL
-8V
S401-b
+8V
C470
0.01
200mV/div
CAL
RV 5406
100K
R470
470K
TR470
2SK404E
R472
1.5K
RV473
50K
R471
4.7K
R473
10K
-8V
-8V



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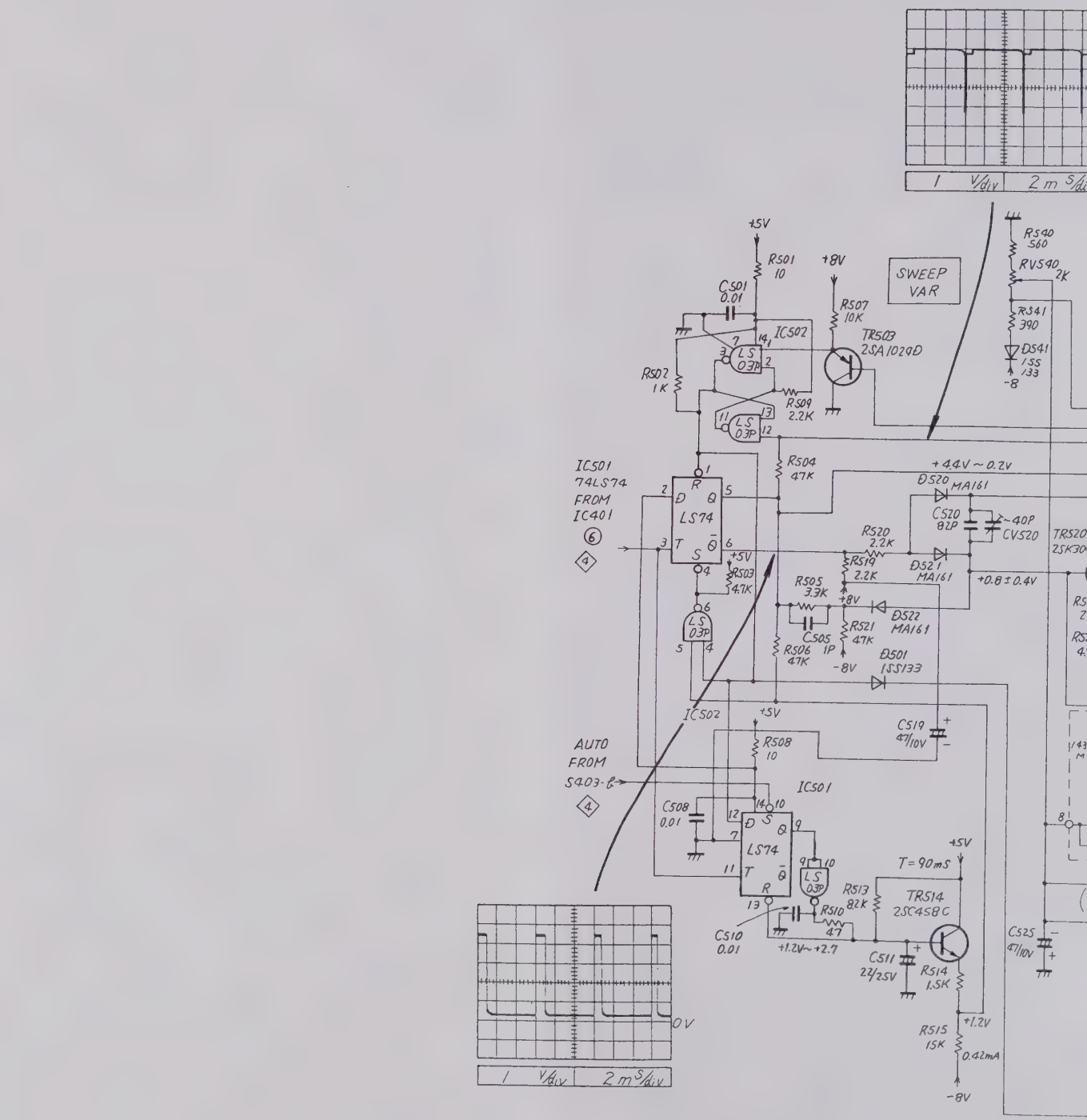
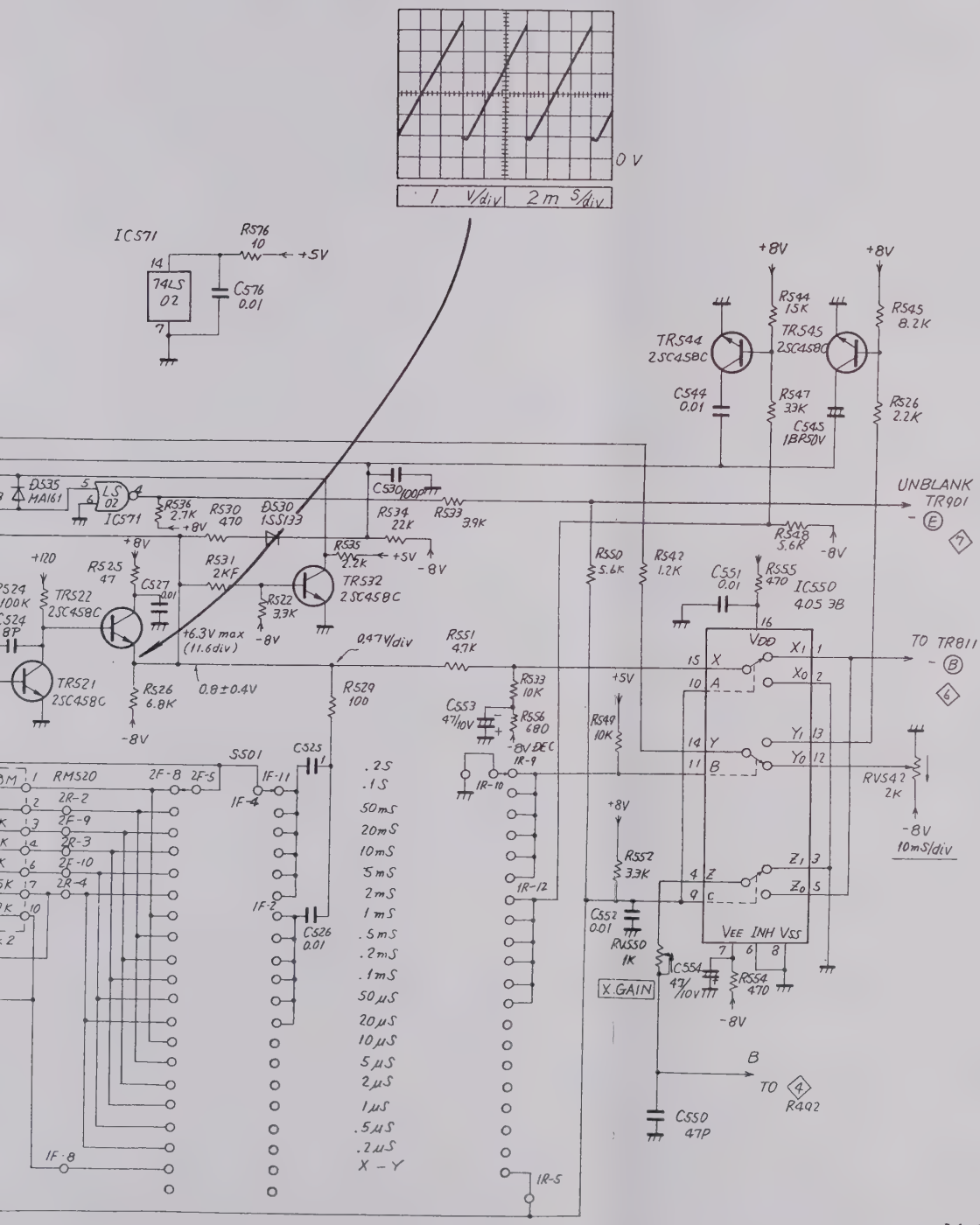
TRIG GEN ④


1 V/div 2 m S/div
+5V
R501 10
+8V
SWEEP VAR
C501 0.01
R507 10K
IC502
TR503 2SA1020D
R502 1K
R509 2.2K
LS 03P
RS40 560
RVS40 2K
RS41 390
DS41 1SS133
-8
IC501 74LS74 FROM IC401
R504 47K
+4.4V ~ 0.2V
DS20 MA161
CS20 82P
~40P CVS20
RS20 2.2K
RS19 2.2K
DS21 MA161
+0.8 ± 0.4V
R503 4.7K
R505 3.3K
DS22 MA161
C505 1P
RS21 47K
R506 47K
-8V
DS01 1SS133
IC502
CS19 47/10V
AUTO FROM S403-b
R508 10
IC501
C508 0.01
T=90mS
TR514 2SC458C
R513 82K
R510 47
CS10 0.01
+1.2V~+2.7
CS11 22/25V
R514 1.5K
CS25 47/10V
R515 15K
0.42mA
0V
1 V/div 2 m S/div



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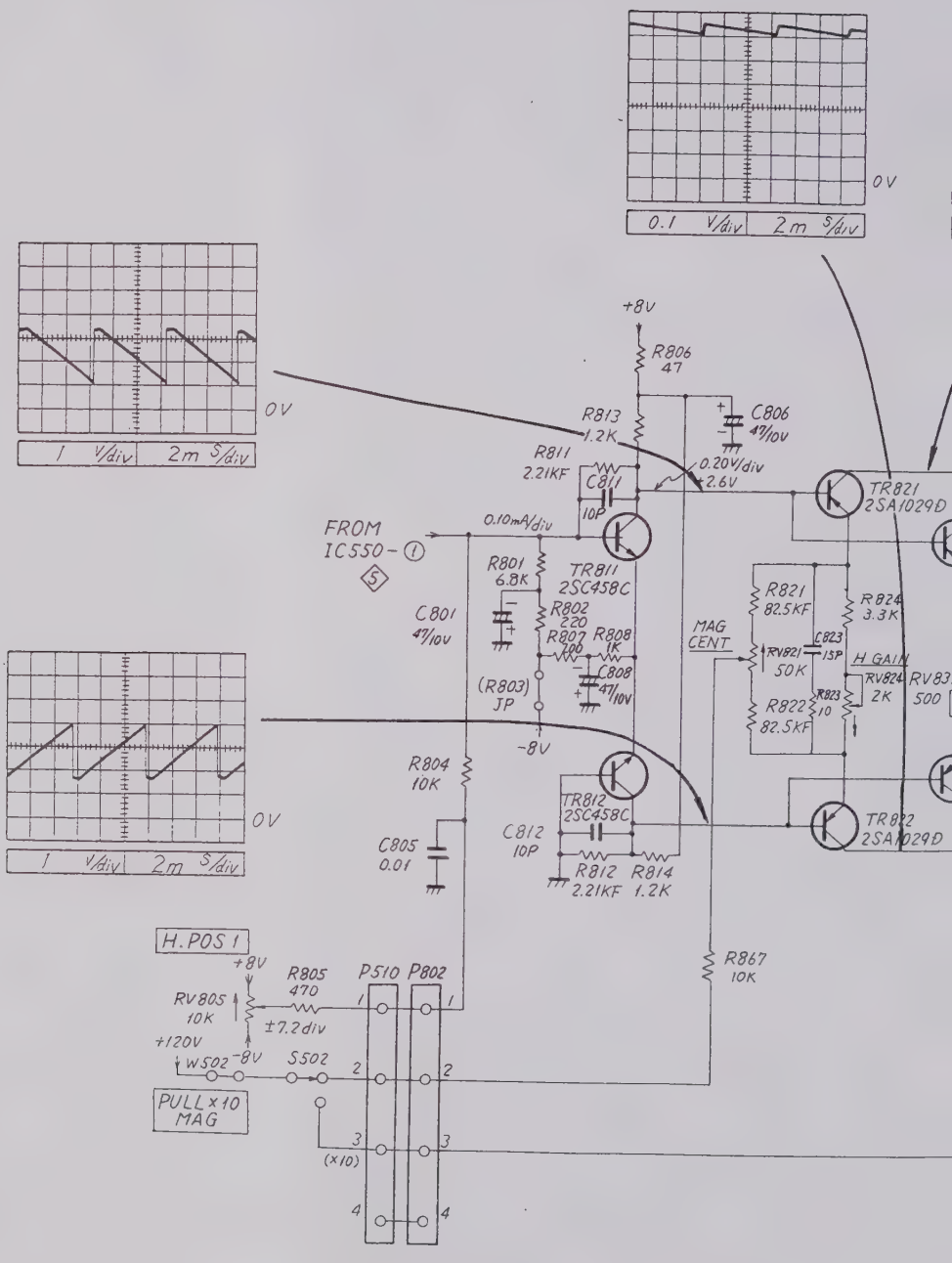
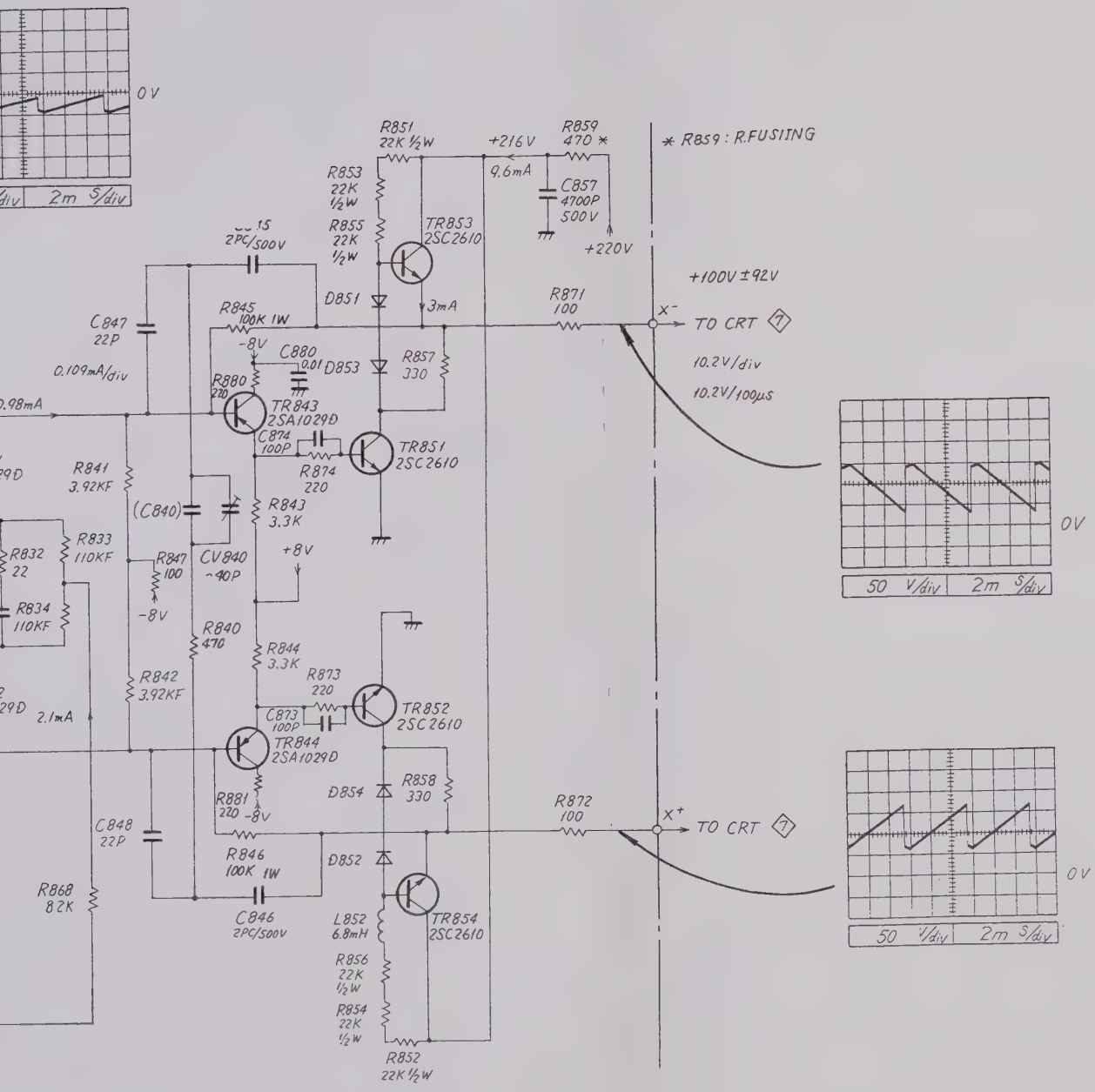
SWEEP GEN ⑤


0V
0.1 V/div 2m S/div
0V
1 V/div 2m S/div
0V
1 V/div 2m S/div
+8V
R806 47
R813 1.2K
C806 47/10V
R811 2.21KF
C811 10P
0.20V/div +2.6V
TR821 2SA1029D
FROM IC550-1
5
0.10mA/div
R801 6.8K
TR811 2SC458C
C801 47/10V
R802 220
R807 100
R808 1K
C808 47/10V
(R803) JP
-8V
MAG CENT
R821 82.5KF
RV821 50K
C823 15P
R824 3.3K
H GAIN
RV824 2K
R823 10
R822 82.5KF
RV83 500
R804 10K
C805 0.01
TR812 2SC458C
C812 10P
R812 2.21KF
R814 1.2K
TR822 2SA1029D
R867 10K
H.POS 1
+8V
R805 470
RV805 10K
±7.2div
+120V
W502
-8V
S502
P510
P802
PULL x10 MAG
(x10)


0V
2m S/div
R851 22K ½W
+216V
R859 470 *
* R859 : R.FUSIING
9.6mA
C857 4700P 500V
+220V
R853 22K ½W
R855 22K ½W
TR853 2SC2610
C847 22P
R845 100K 1W
D851
3mA
R871 100
X⁻
TO CRT 7
+100V±92V
10.2V/div
10.2V/100μs
C880 0.01
D853
R857 330
R880 220
TR843 2SA1029D
C874 100P
TR851 2SC2610
R874 220
R841 3.92KF
(C840)
R843 3.3K
R832 22
R833 110KF
R847 100
CV840 ~40P
+8V
-8V
R834 110KF
R840 470
R844 3.3K
R842 3.92KF
R873 220
TR852 2SC2610
C873 100P
TR844 2SA1029D
2.1mA
R881 220
D854
R858 330
R872 100
X⁺
TO CRT 7
C848 22P
R846 100K 1W
D852
R868 82K
C846 2PC/500V
L852 6.8mH
TR854 2SC2610
R856 22K ½W
R854 22K ½W
R852 22K ½W
50 V/div
2m S/div
0V

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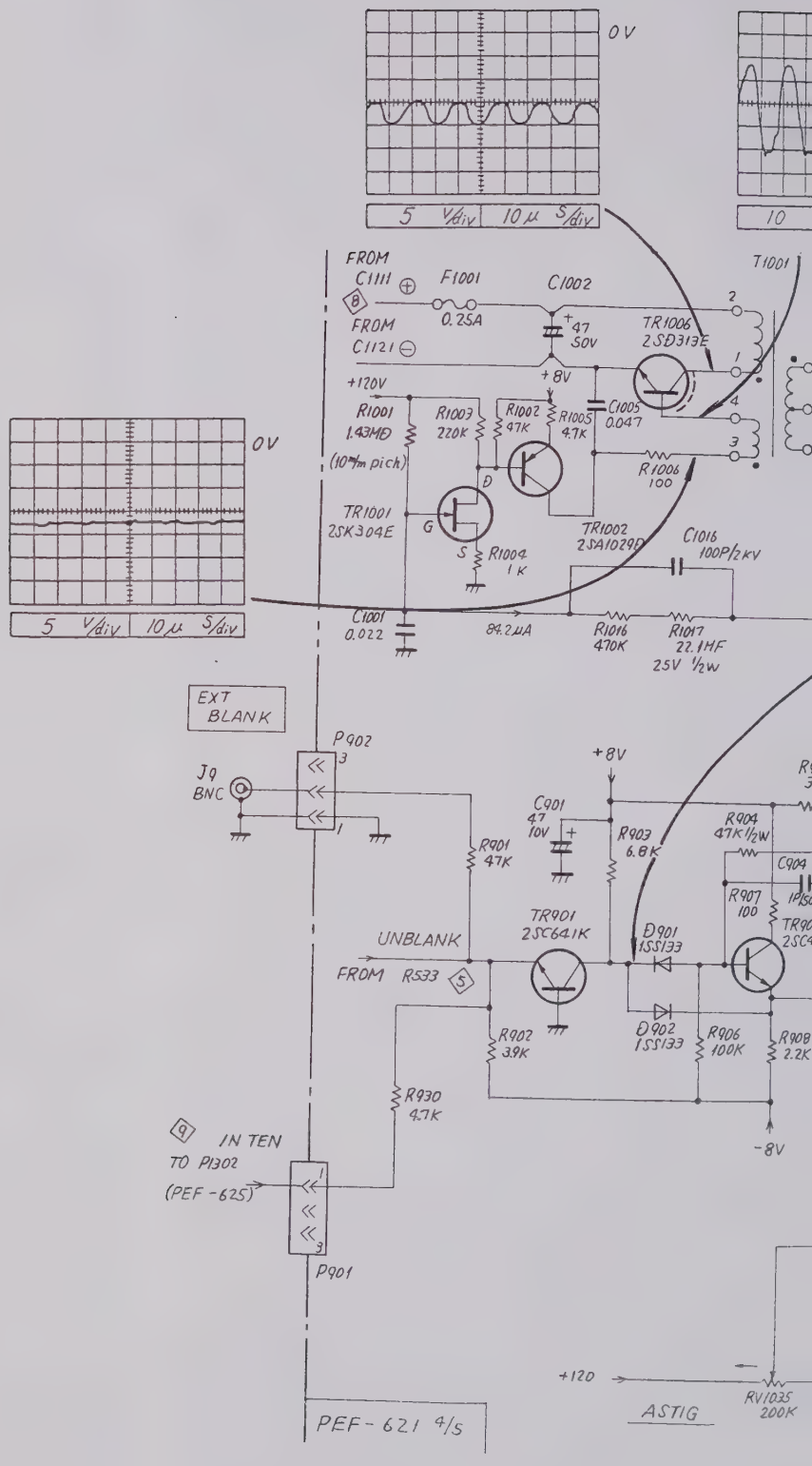
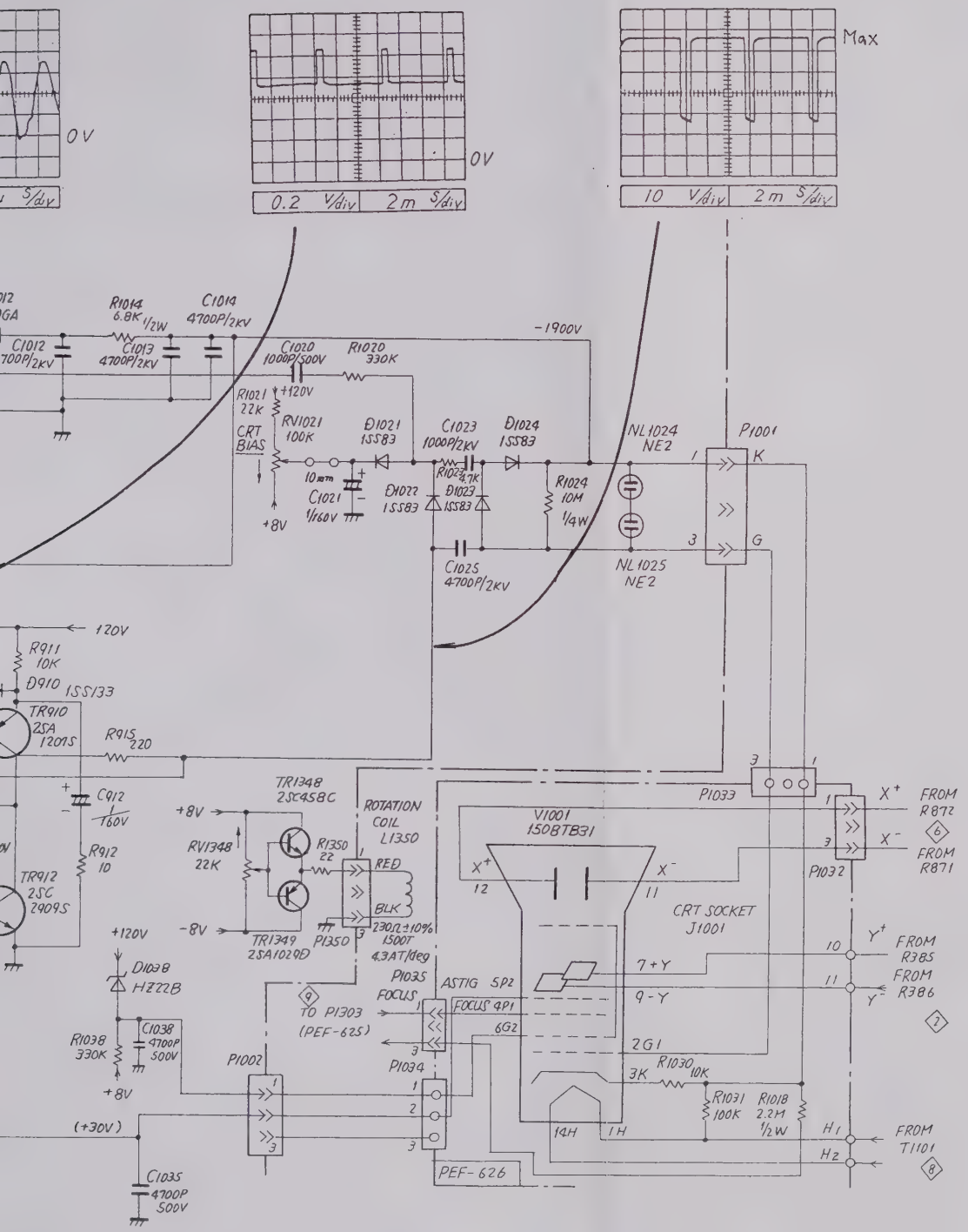
H AMP 6


0V
5 V/div 10μ S/div
10
FROM C1111
FROM C1121
F1001
0.25A
C1002
47 50V
T1001
TR1006 2SD313E
+8V
+120V
R1001 1.43MΩ (10Tm pich)
R1003 220K
R1002 47K
R1005 4.7K
C1005 0.047
R1006 100
TR1001 2SK304E
TR1002 2SA1029D
R1004 1K
C1016 100P/2KV
C1001 0.022
84.2μA
R1016 470K
R1017 22.1MF 25V 1/2W
EXT BLANK
P902
J9 BNC
R901 47K
C901 47 10V
R903 6.8K
R904 47K 1/2W
C904
R907 100
TR901 2SC641K
D901 1SS133
UNBLANK
FROM RS33
R902 3.9K
D902 1SS133
R906 100K
R908 2.2K
-8V
R930 4.7K
IN TEN
TO P1302
(PEF-625)
P901
+120
RV1035 200K
ASTIG
PEF-621 4/5



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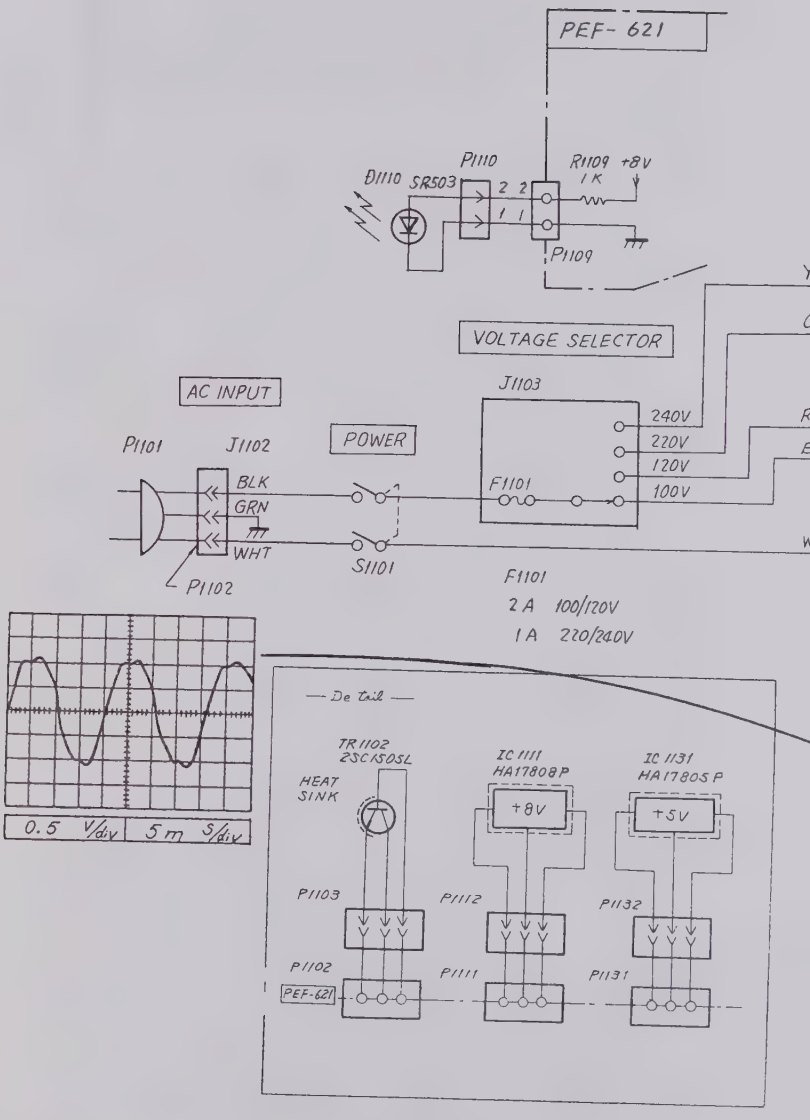
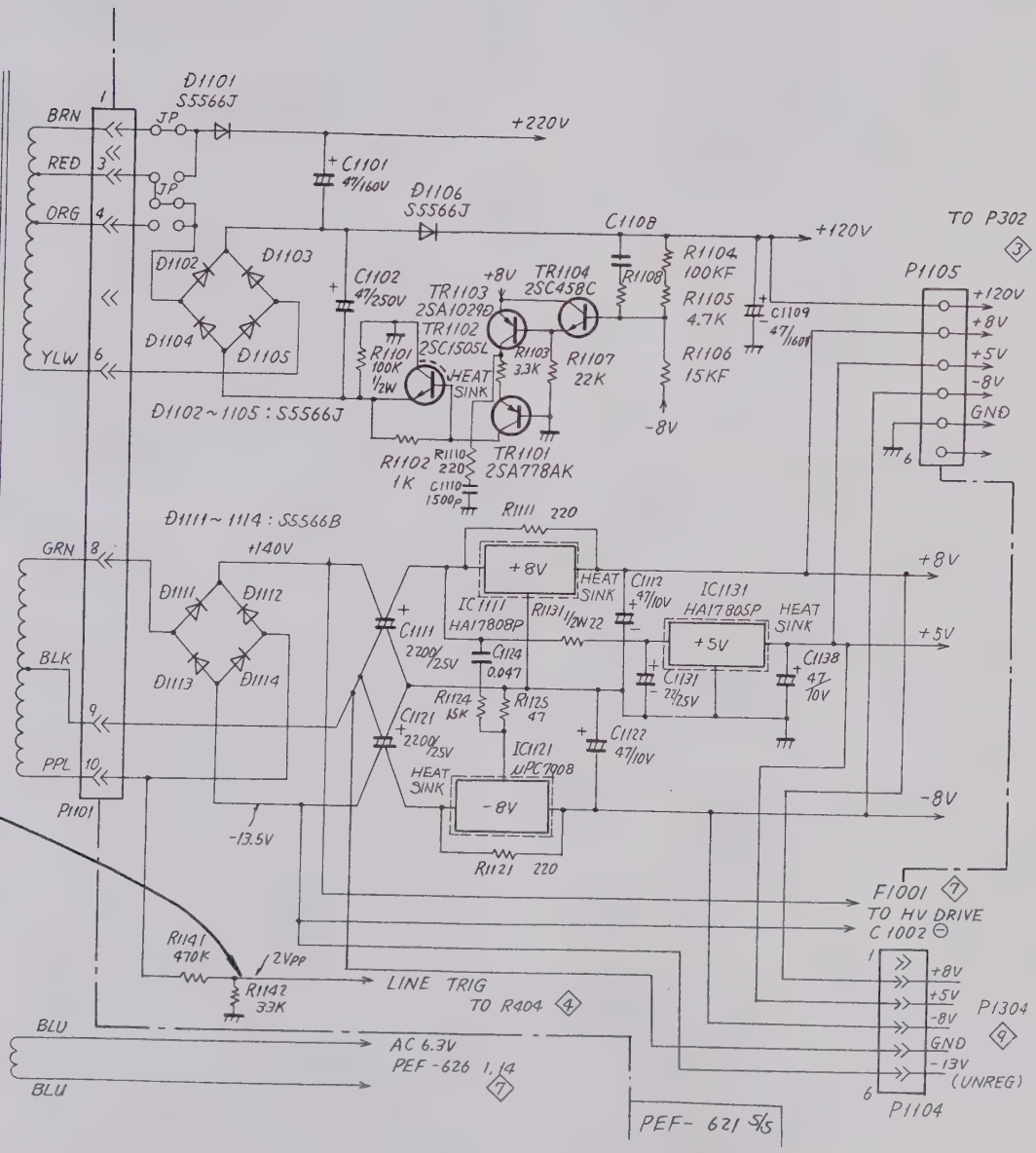
HV & Z AMP ⑦


PEF- 621
P1110
D1110 SR503
R1109 +8V
1K
2 2
1 1
P1109
VOLTAGE SELECTOR
AC INPUT
J1103
240V
220V
120V
100V
P1101
J1102
POWER
BLK
GRN
WHT
F1101
S1101
P1102
F1101
2A 100/120V
1A 220/240V
0.5 V/div
5m S/div
— De tail —
TR1102
2SC1505L
HEAT SINK
IC1111
HA17808P
+8V
IC1131
HA17805P
+5V
P1103
P1112
P1132
P1102
PEF-621
P1111
P1131



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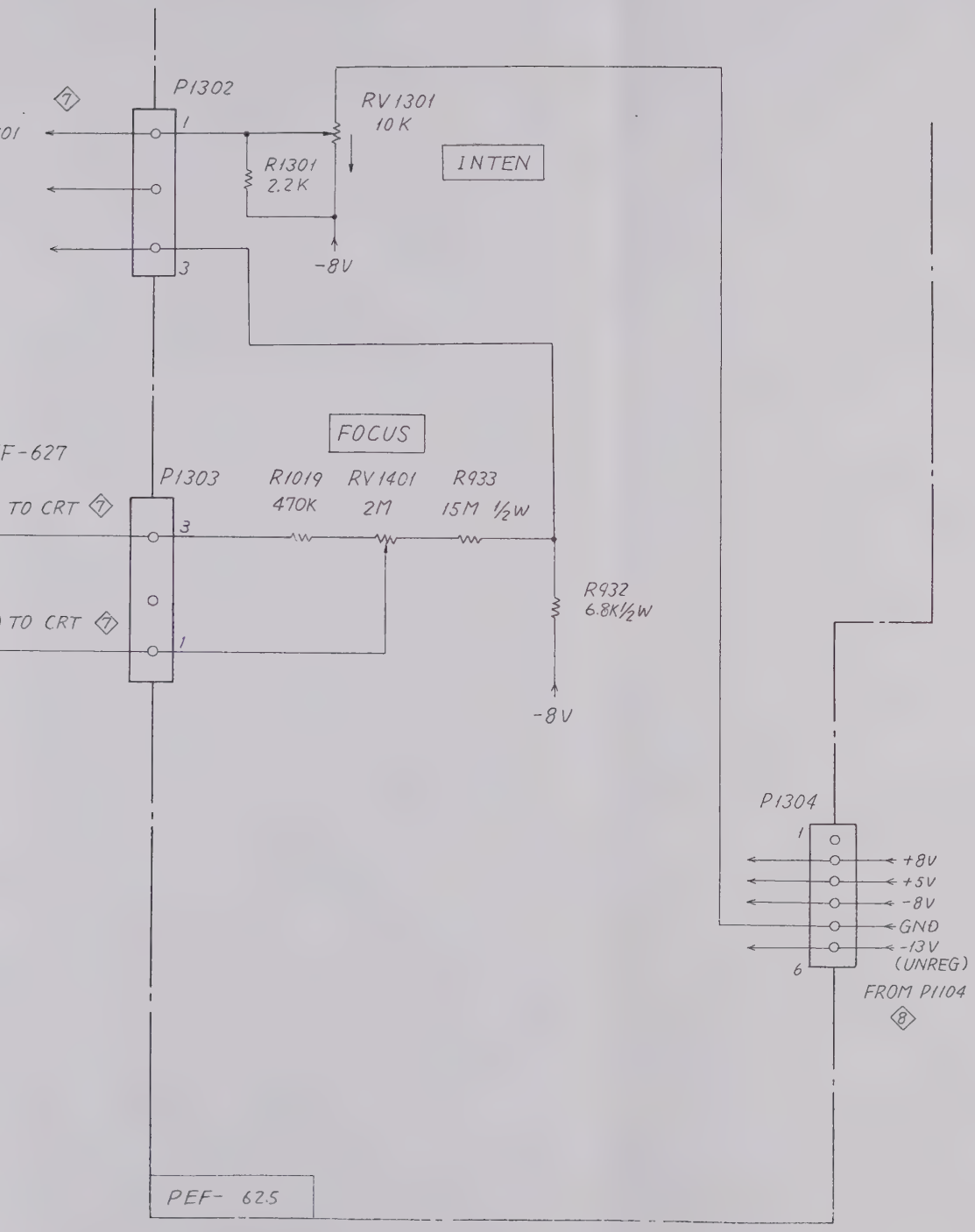
POWER SUPPLY ⑧



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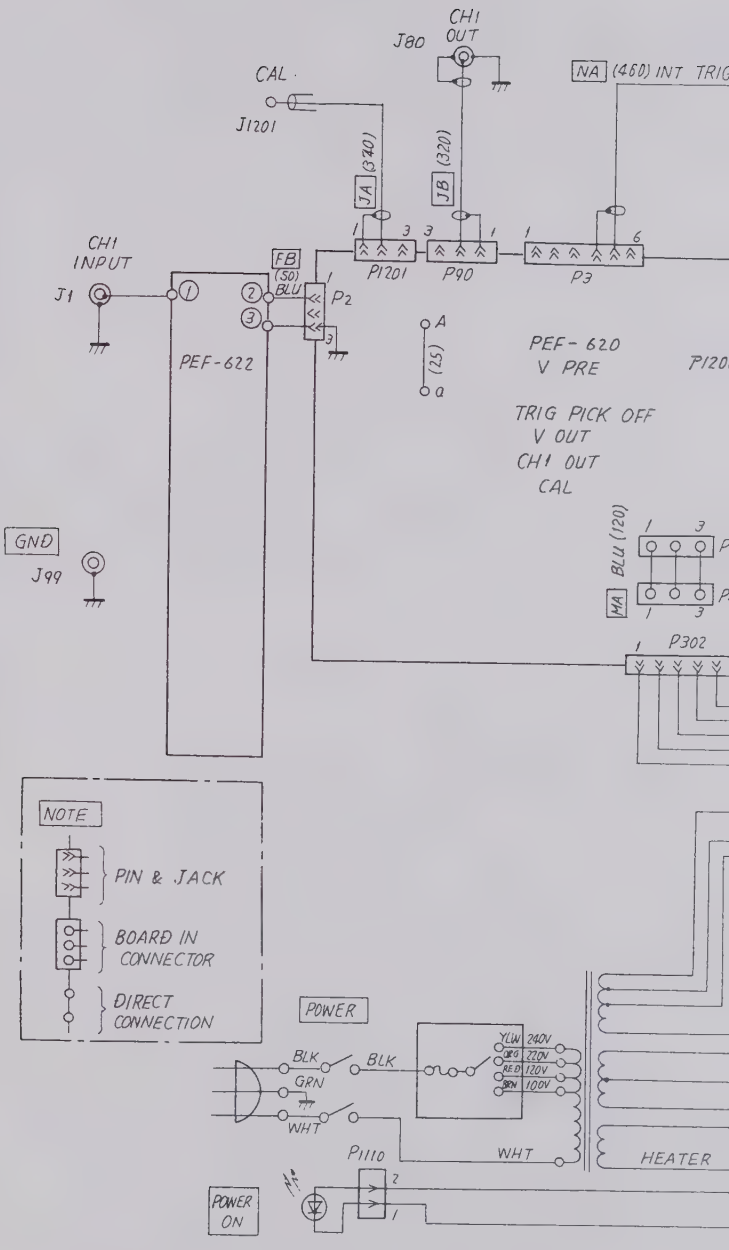
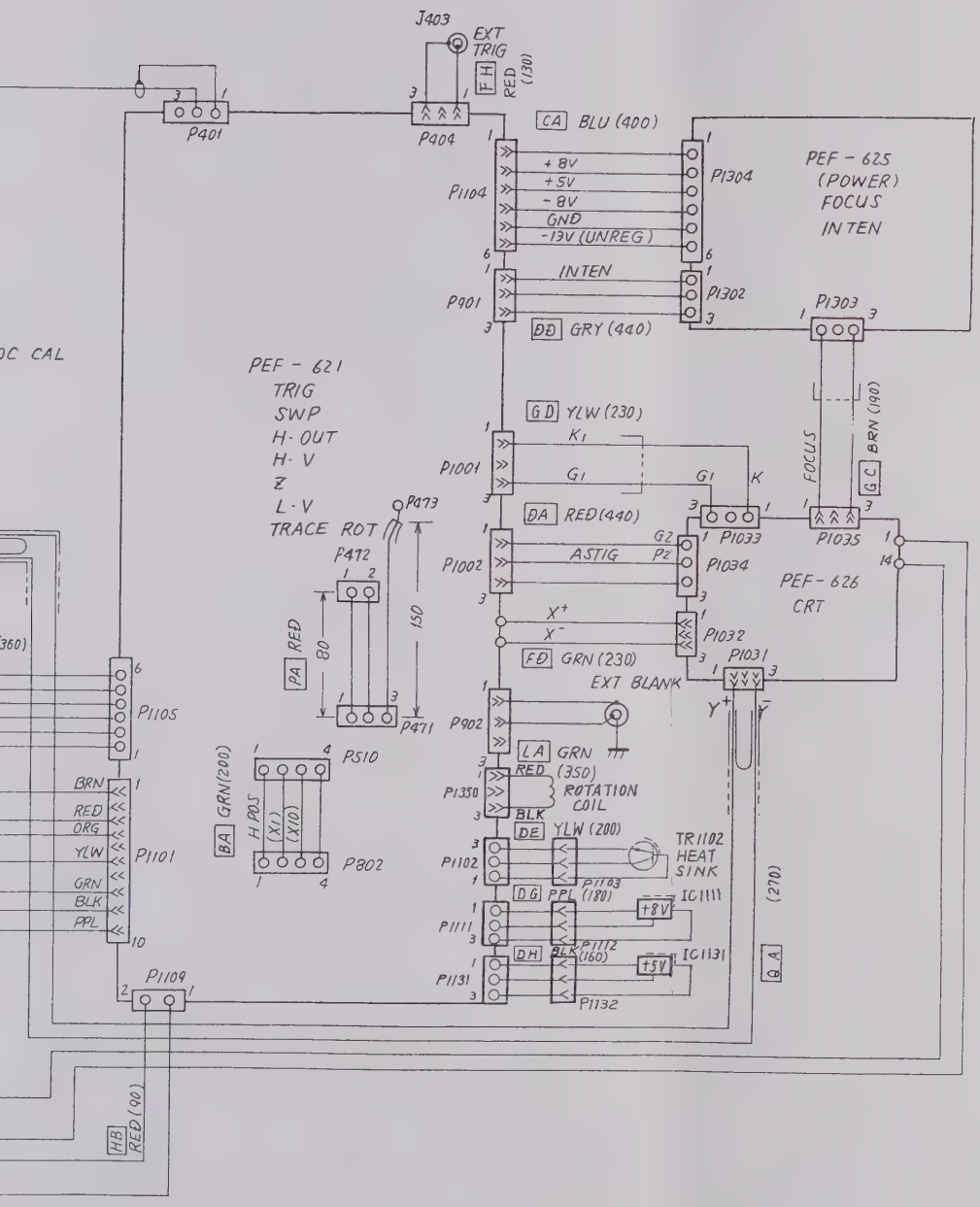
RV/LAMP ⑨


CH1 OUT
J80
CAL
J1201
NA (460) INT TRIG
JA (340)
JB (320)
CH1 INPUT
J1
FB (50) BLU
P1201
P90
P3
P2
PEF-622
PEF-620 V PRE
P120
TRIG PICK OFF
V OUT
CH1 OUT
CAL
GND
J99
BLU (120)
MA
P302
NOTE
PIN & JACK
BOARD IN CONNECTOR
DIRECT CONNECTION
POWER
BLK
BLK
GRN
WHT
YLW 240V
ORG 220V
RED 110V
BRN 100V
WHT
HEATER
P1110
POWER ON



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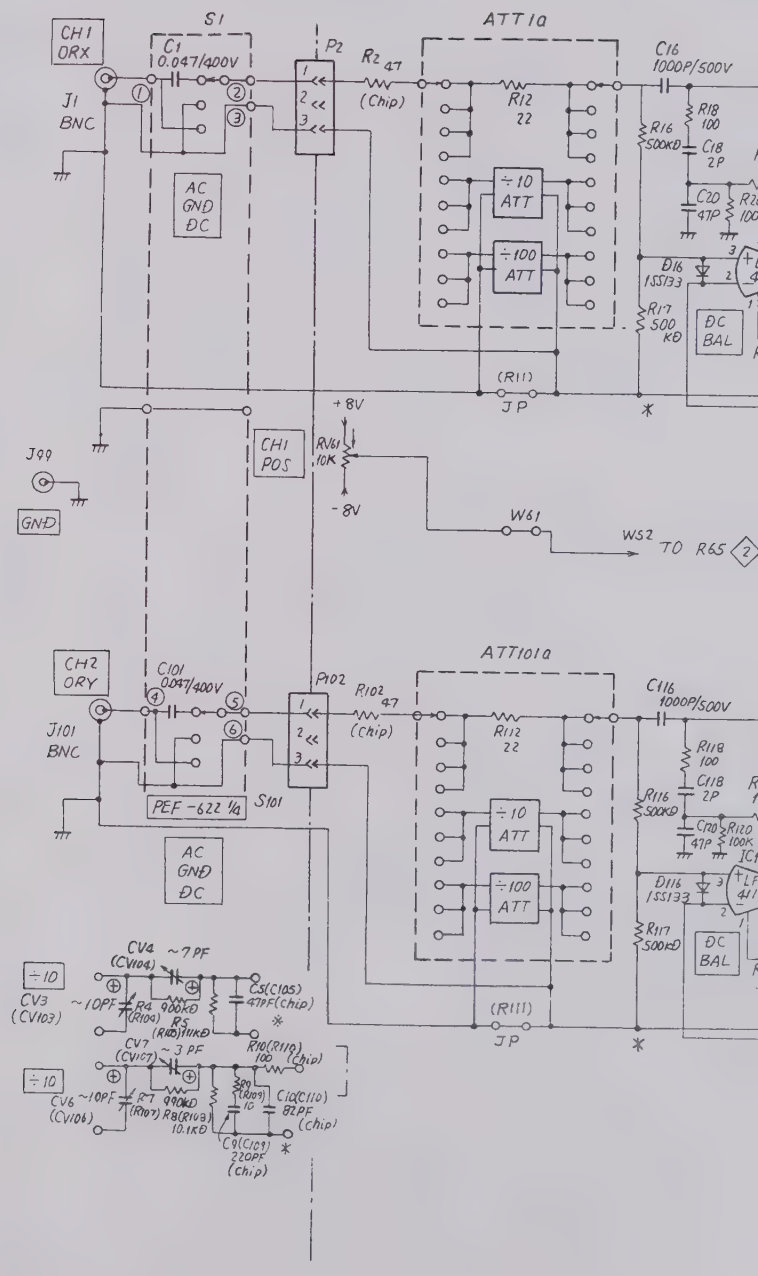
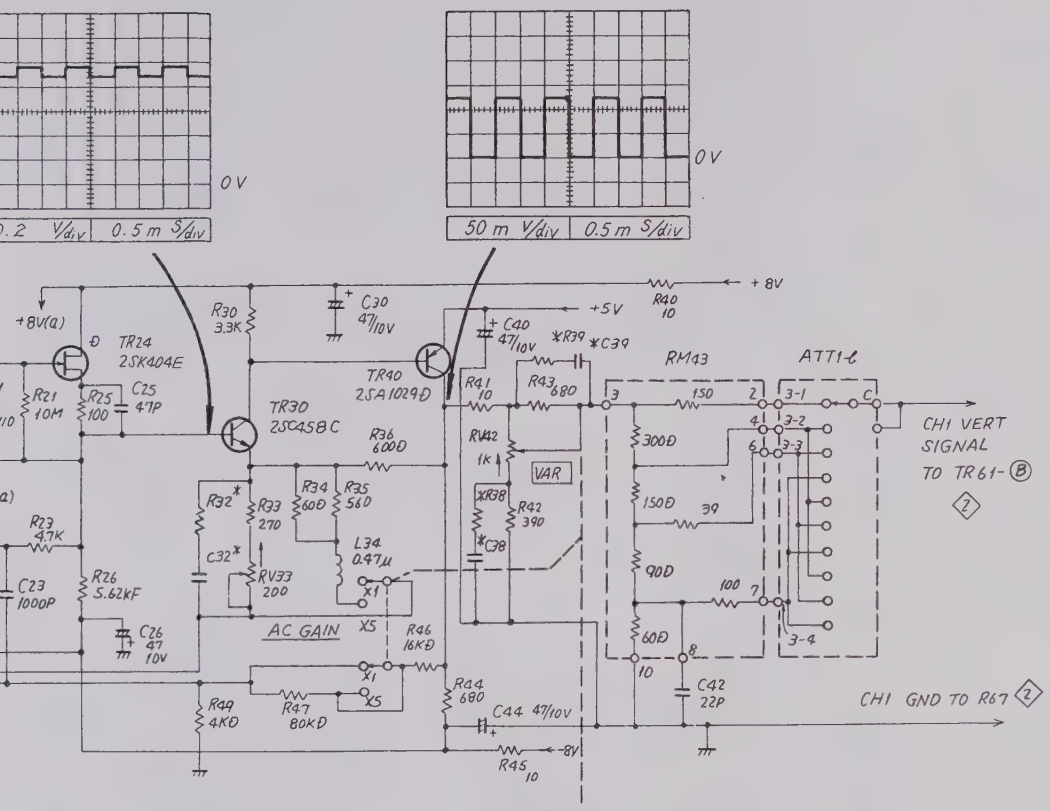
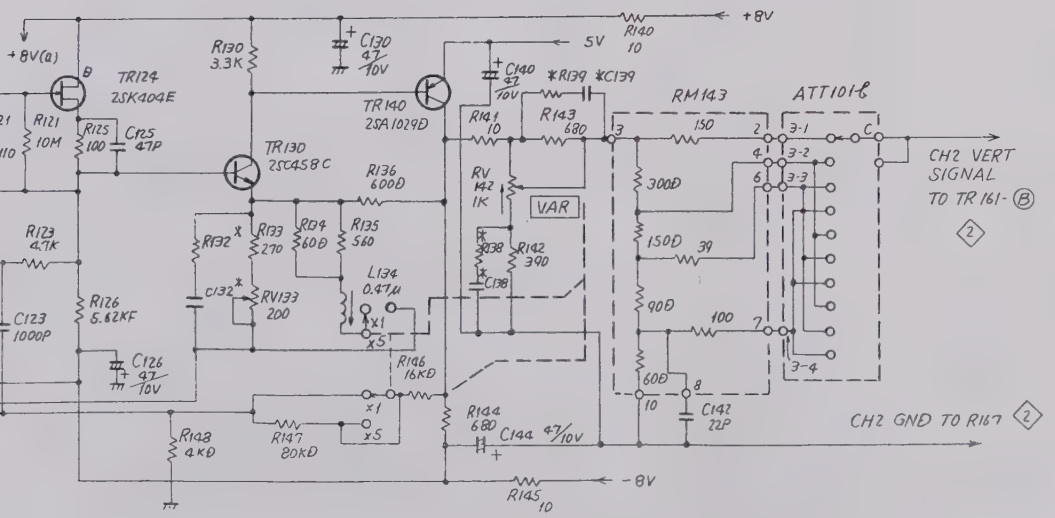
WIRING DIAGRAM


CH1 ORX
J1 BNC
S1
C1 0.047/400V
AC GND DC
P2
R2 47 (Chip)
ATT1a
R12 22
÷10 ATT
÷100 ATT
C16 1000P/500V
R18 100
R16 500KΩ
C18 2P
C20 47P
D16 1SS133
R17 500 KΩ
DC BAL
(R111)
JP
CH1 POS
RV61 10K
+8V
-8V
W61
W52
TO R65
J99
GND
CH2 ORY
J101 BNC
C101 0.047/400V
P102
R102 47 (Chip)
ATT101a
R112 22
C116 1000P/500V
R118 100
C118 2P
R116 500KΩ
C120 47P
R120 100K
D116 1SS133
R117 500KΩ
DC BAL
PEF-622 1/a
S101
CV4 ~7PF (CV104)
÷10
CV3 (CV103)
~10PF
R4 (R104) 990KΩ
R5 (R105) 11KΩ
C5(C105) 47PF(Chip)
CV7 (CV107) ~3 PF
R10(R110) 100 (Chip)
CV6 (CV106)
R7 (R107) 990KΩ
R8(R108) 10.1KΩ
R9 (R109) 10
C10(C110) 82PF (Chip)
C9(C109) 220PF (Chip)





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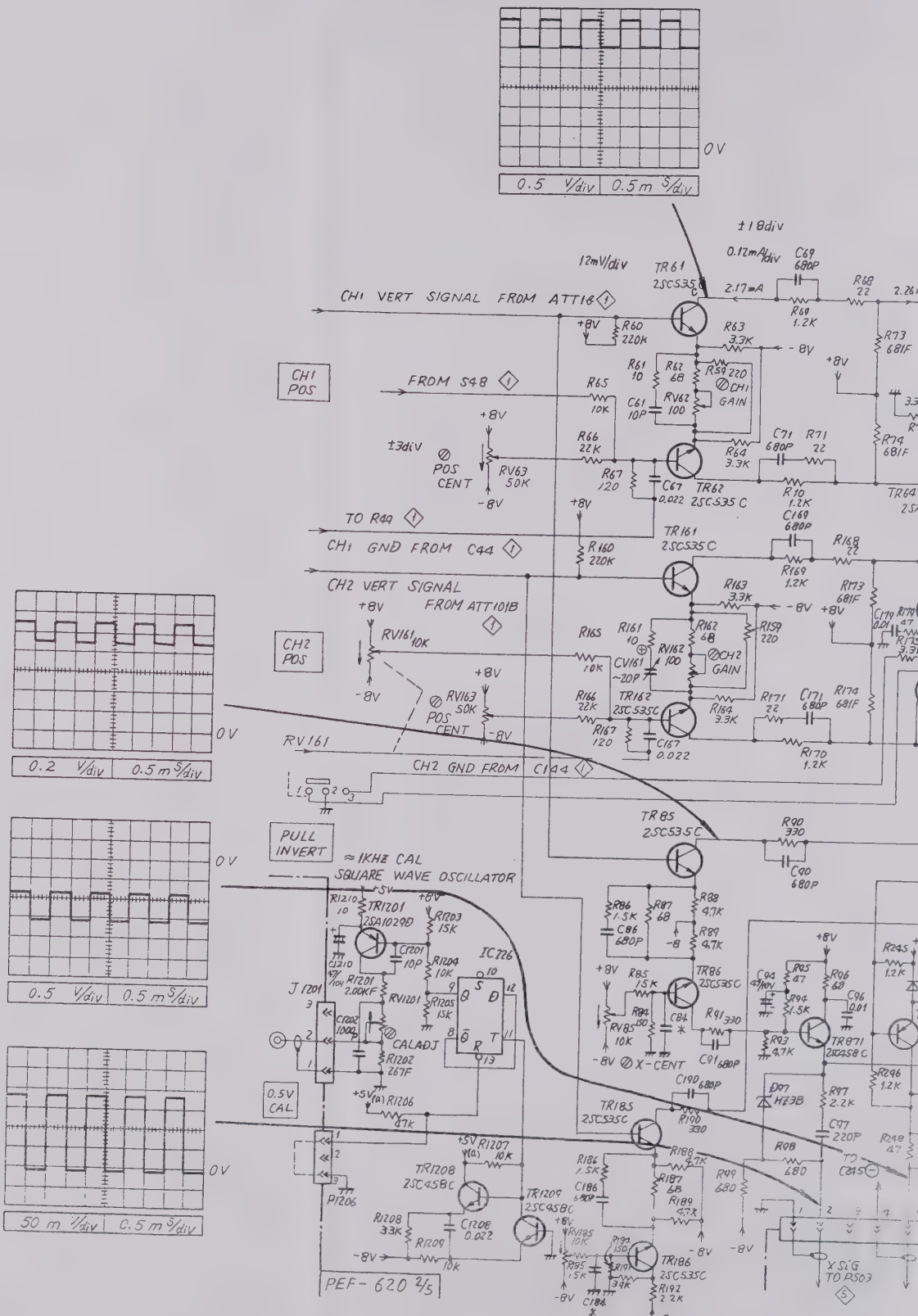
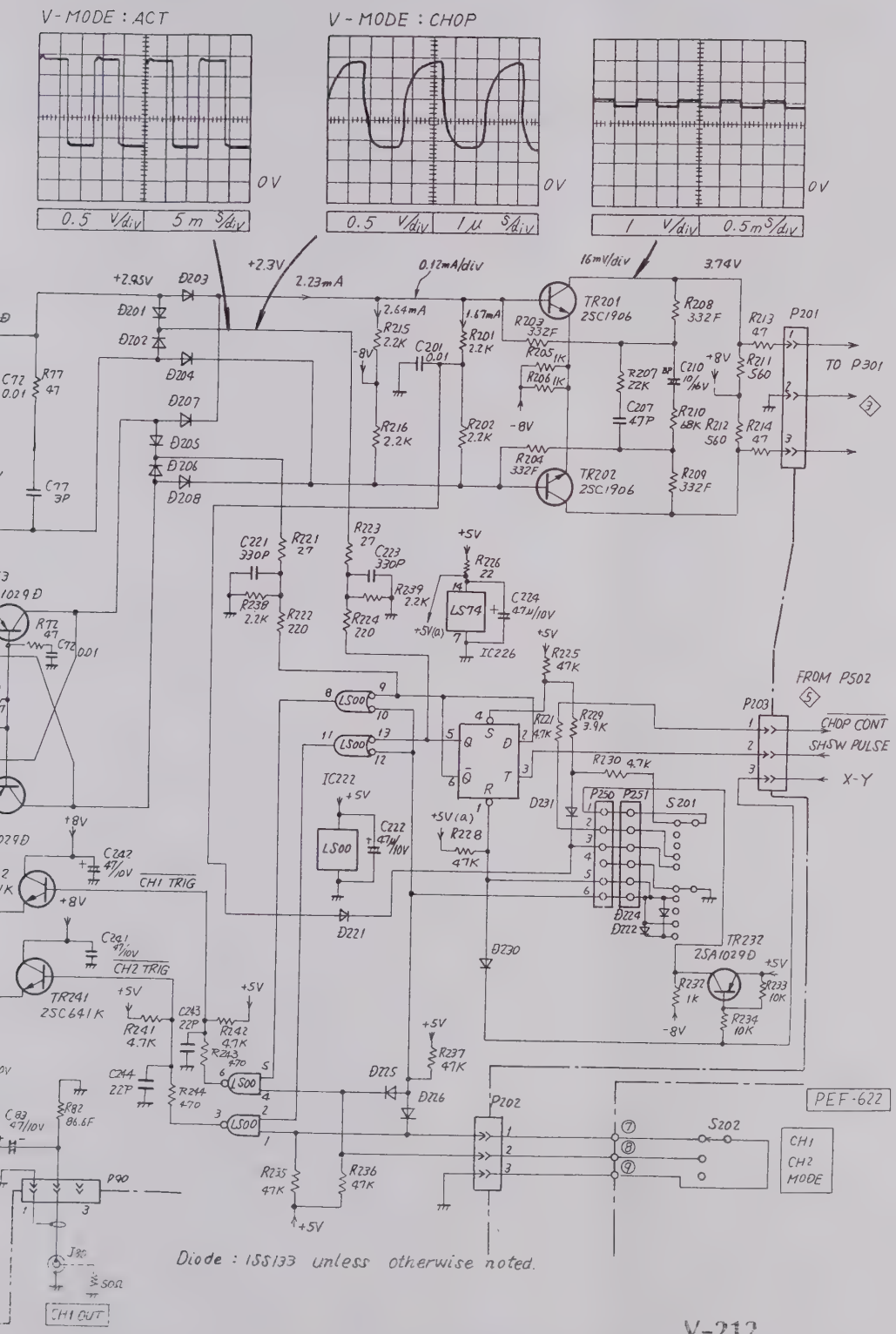
INPUT AMP ①


0V
0.5 V/div
0.5 m S/div
±1 8div
12mV/div
0.12mA/div
TR61 2SC535C
2.17mA
C69 680P
R68 22
R69 1.2K
CH1 VERT SIGNAL FROM ATT1B
+8V
R60 220K
R63 3.3K
-8V
R73 681F
CH1 POS
FROM S48
R65 10K
R61 10
R62 68
R59 220
CH1 GAIN
RV62 100
C61 10P
±3div
POS CENT
RV63 50K
R66 22K
R67 120
C67 0.022
TR62 2SC535C
C71 680P
R71 22
R64 3.3K
R10 1.2K
R74 681F
TO R49
CH1 GND FROM C44
TR161 2SC535C
C169 680P
R168 22
R169 1.2K
R160 220K
CH2 VERT SIGNAL FROM ATT101B
R163 3.3K
R173 681F
RV161 10K
CH2 POS
R165 10K
R161 10
R162 68
R159 220
CH2 GAIN
RV162 100
CV161 ~20P
RV163 50K
POS CENT
R166 22K
TR162 2SC535C
R164 3.3K
R171 22
C171 680P
R174 681F
R167 120
C167 0.022
R170 1.2K
RV161
CH2 GND FROM C144
0.2 V/div
0.5 m S/div
PULL INVERT
≈1KHz CAL
SQUARE WAVE OSCILLATOR
TR85 2SC535C
R90 330
C90 680P
R1210 10
TR1201 2SA1029D
R1203 15K
C1201 10P
C1210 47 10V
R1201 2.00KF
R1204 10K
IC726
J1201
RV1201
R1205 15K
C1202 100P
CALADJ
R1202 267F
R1206 47K
0.5V CAL
R1207 10K
TR1208 2SC458C
TR1209 2SC458C
R1208 33K
C1208 0.022
R1209 10K
P1206
PEF-620 2/5
R86 1.5K
C86 680P
R87 68
R88 4.7K
R89 4.7K
TR86 2SC535C
R85 15K
RV85 10K
X-CENT
R84 150
C84 *
R91 330
C91 680P
C190 680P
TR185 2SC535C
R190 330
R188 4.7K
R186 1.5K
C186 680P
R187 68
R189 4.7K
R185 10K
R191 150
R195 1.5K
R194 3.9K
TR186 2SC535C
R192 2.2K
C185 *
C94 47 10V
R95 47
R96 68
C96 0.01
R94 1.5K
TR87 2SC458C
R93 4.7K
R97 2.2K
C97 220P
R98 680
R99 680
D97 HE3B
R245 1.2K
R246 1.2K
R248 47
TO C815
XSIG TO RS03
0.5 V/div
0.5 m S/div
50 m V/div
0.5 m S/div



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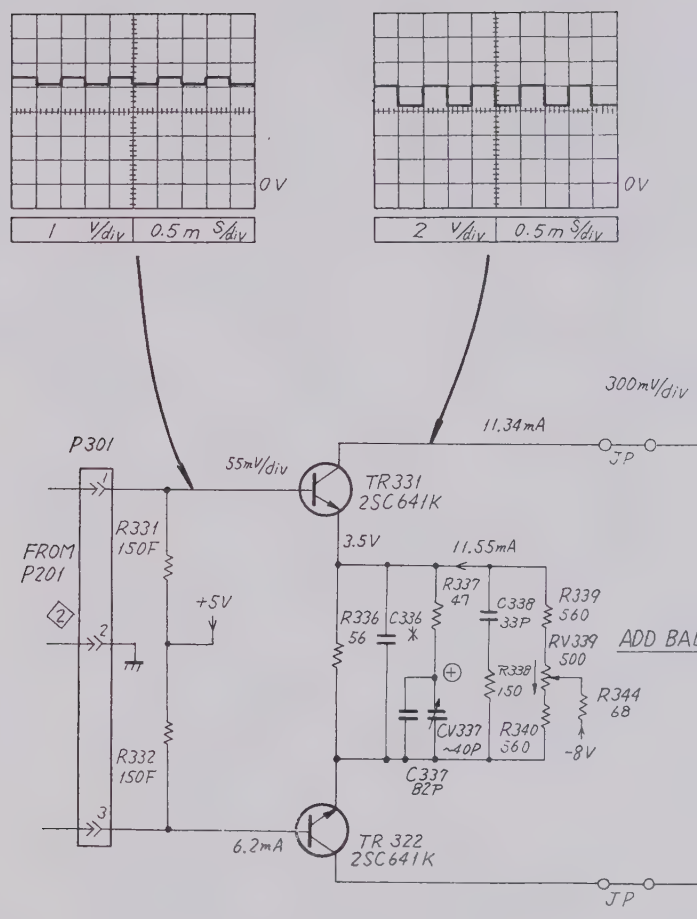
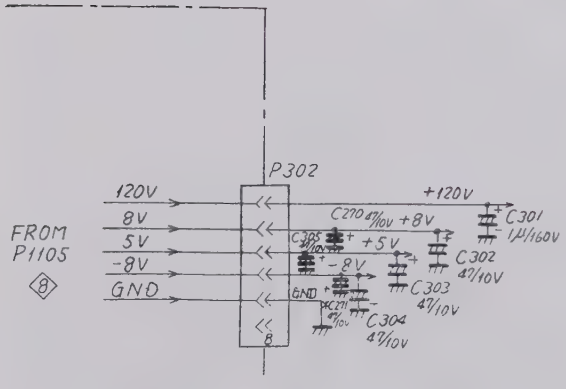
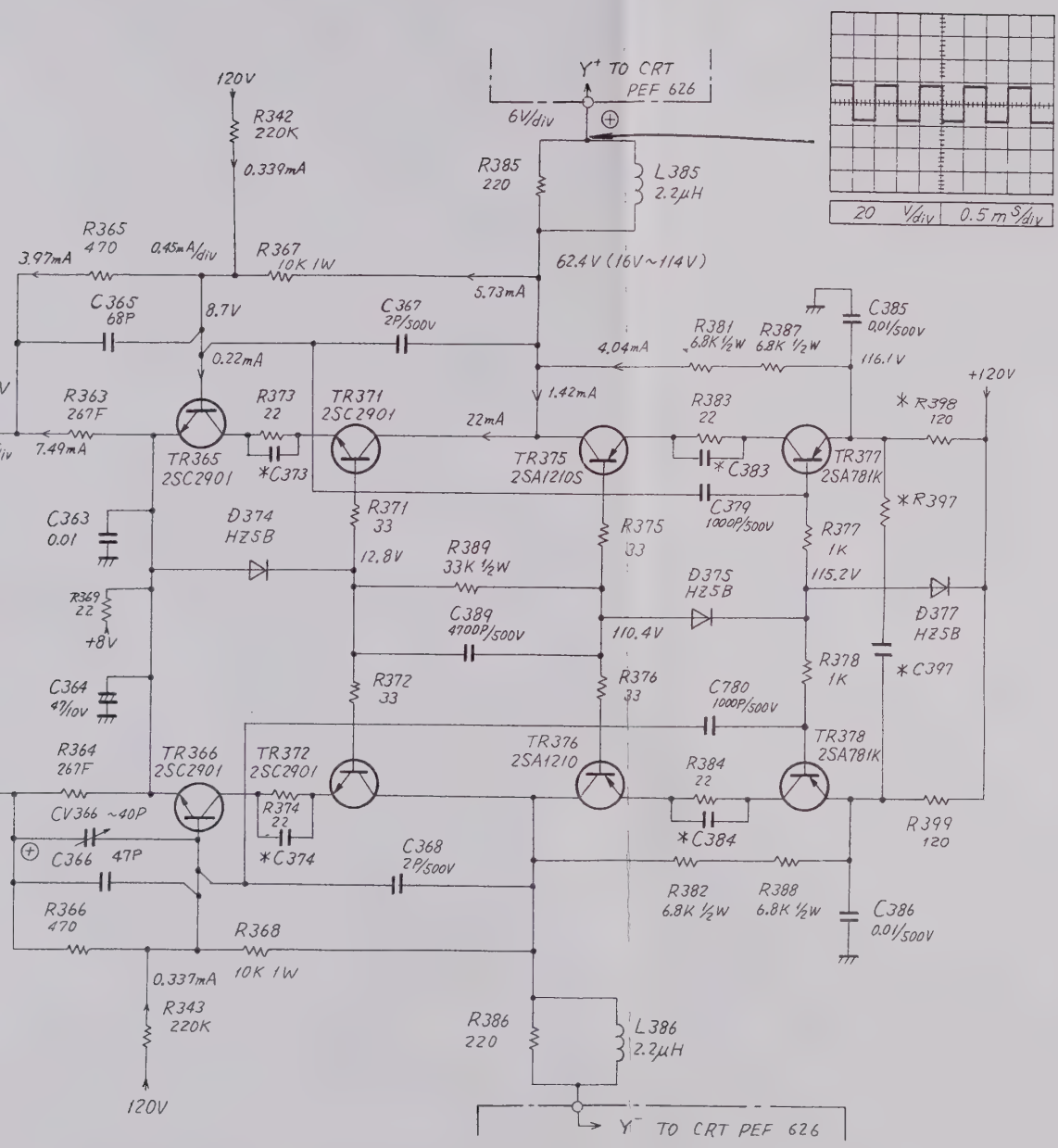
VERT PREAMP TRIG PICKOFF & CH SW MULTI ②


0V
1 V/div
0.5m S/div
0V
2 V/div
0.5m S/div
300mV/div
11.34mA
JP
P301
55mV/div
TR331
2SC641K
FROM
P201
R331
150F
+5V
3.5V
11.55mA
R337
47
C338
33P
R339
560
R336
56
C336
R338
150
RV339
500
ADD BAL
R344
68
CV337
~40P
R340
560
-8V
C337
82P
R332
150F
6.2mA
TR 322
2SC641K
JP


P302
FROM
P1105
120V
8V
5V
-8V
GND
+120V
C270 47/10V +8V
C301
1μ/160V
+5V
C302
47/10V
-8V
C303
47/10V
GND
C304
47/10V


120V
R342
220K
0.339mA
Y+ TO CRT
PEF 626
6V/div
R385
220
L385
2.2μH
0V
20 V/div
0.5 mS/div
R365
470
3.97mA
0.45mA/div
R367
10K 1W
62.4V (16V~114V)
5.73mA
C365
68P
8.7V
C367
2P/500V
0.22mA
4.04mA
R381
6.8K ½W
R387
6.8K ½W
C385
0.01/500V
116.1V
+120V
R363
267F
7.49mA
R373
22
TR371
2SC2901
1.42mA
22mA
R383
22
*R398
120
TR365
2SC2901
*C373
TR375
2SA1210S
*C383
TR377
2SA781K
C379
1000P/500V
*R397
C363
0.01
D374
HZ5B
R371
33
12.8V
R375
33
R377
1K
115.2V
R389
33K ½W
D375
HZ5B
D377
HZ5B
R369
22
+8V
C389
4700P/500V
110.4V
*C397
C364
47/10V
R372
33
R376
33
C780
1000P/500V
R378
1K
R364
267F
TR366
2SC2901
TR372
2SC2901
TR376
2SA1210
TR378
2SA781K
R384
22
CV366 ~40P
R374
22
*C374
*C384
R399
120
C366 47P
C368
2P/500V
R382
6.8K ½W
R388
6.8K ½W
C386
0.01/500V
R366
470
R368
0.337mA
10K 1W
R343
220K
R386
220
L386
2.2μH
120V
Y- TO CRT PEF 626

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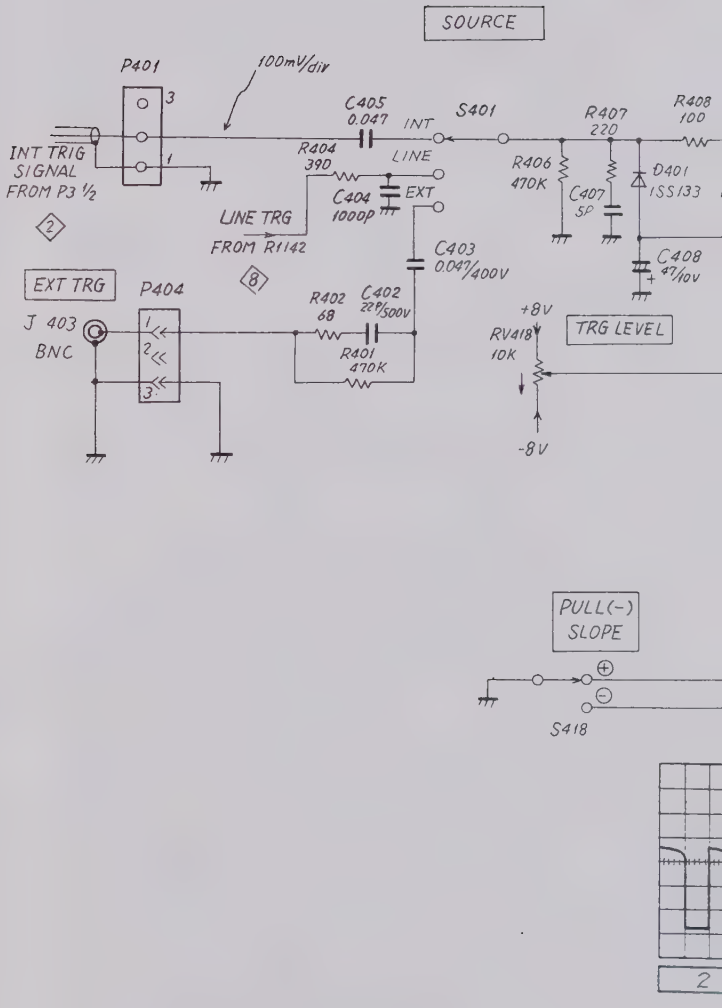
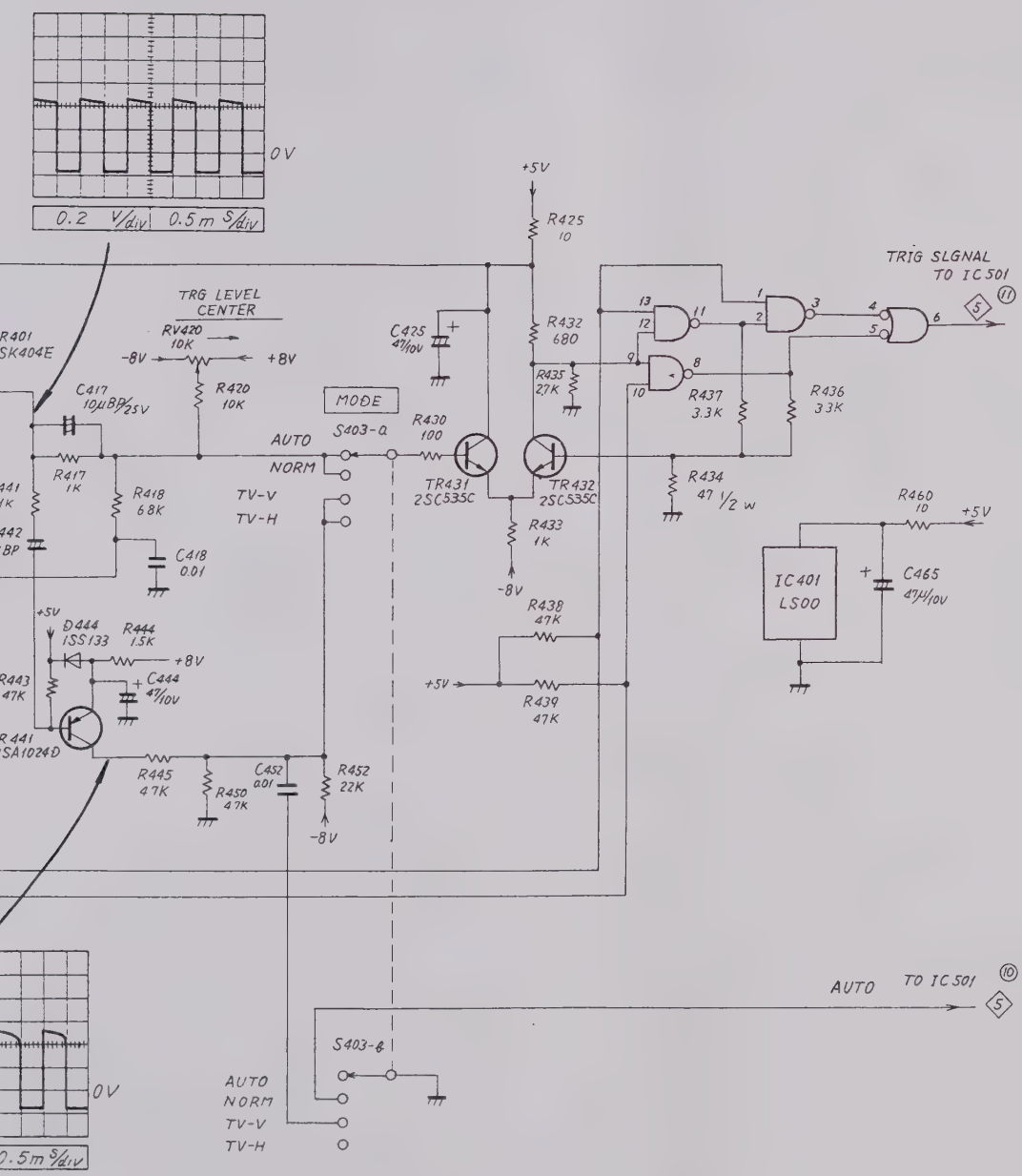
V OUT ③


SOURCE
P401
100mV/dir
C405
0.047
INT
S401
R407
220
R408
100
INT TRIG
SIGNAL
FROM P3 1/2
R404
390
LINE
R406
470K
C407
SP
D401
1SS133
C404
1000P
EXT
LINE TRG
FROM R1142
C403
0.047/400V
C408
47/10V
EXT TRG
P404
R402
68
C402
22P/500V
+8V
TRG LEVEL
J 403
BNC
R401
470K
RV418
10K
-8V
PULL(-)
SLOPE
S418
2



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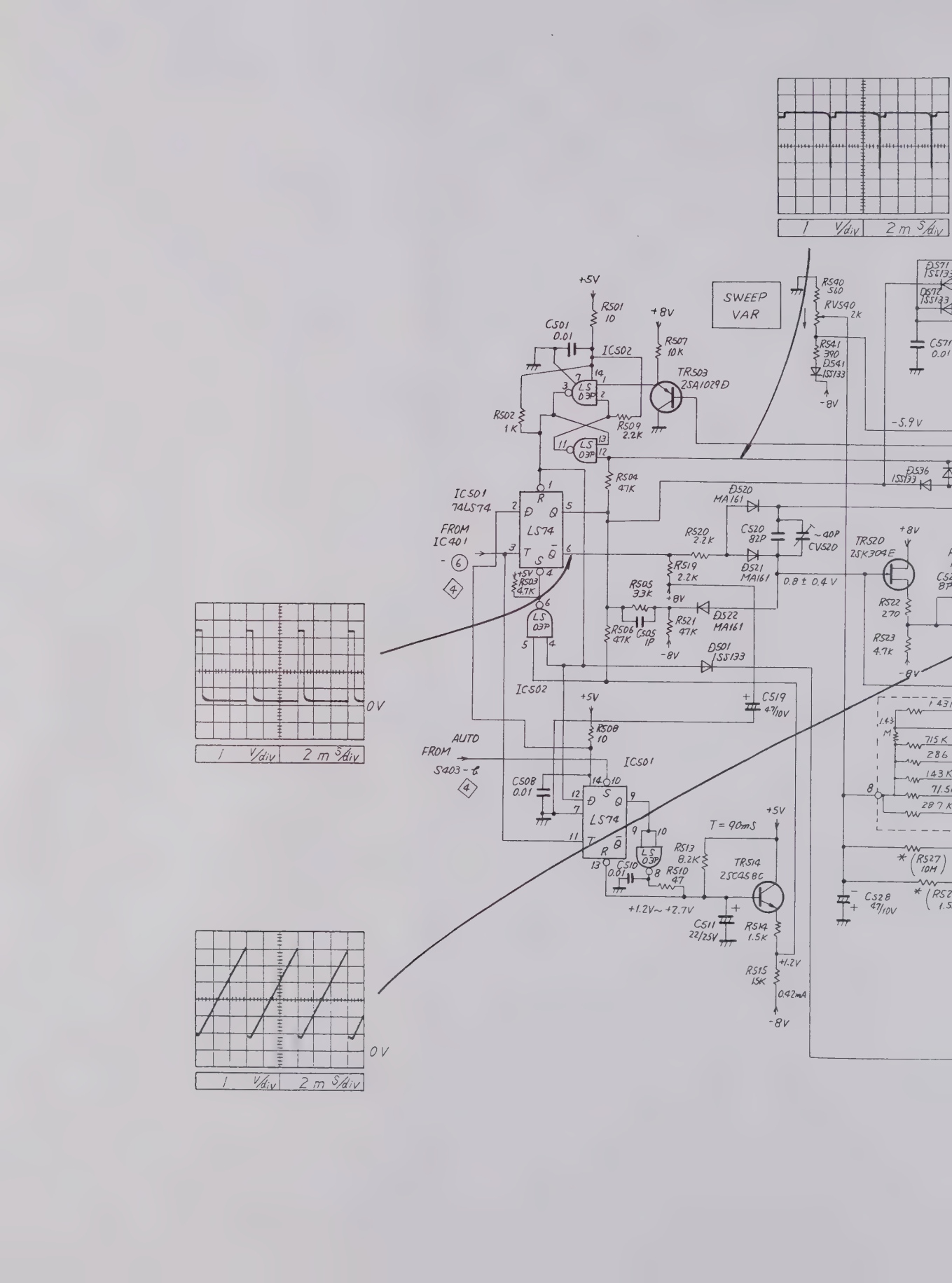
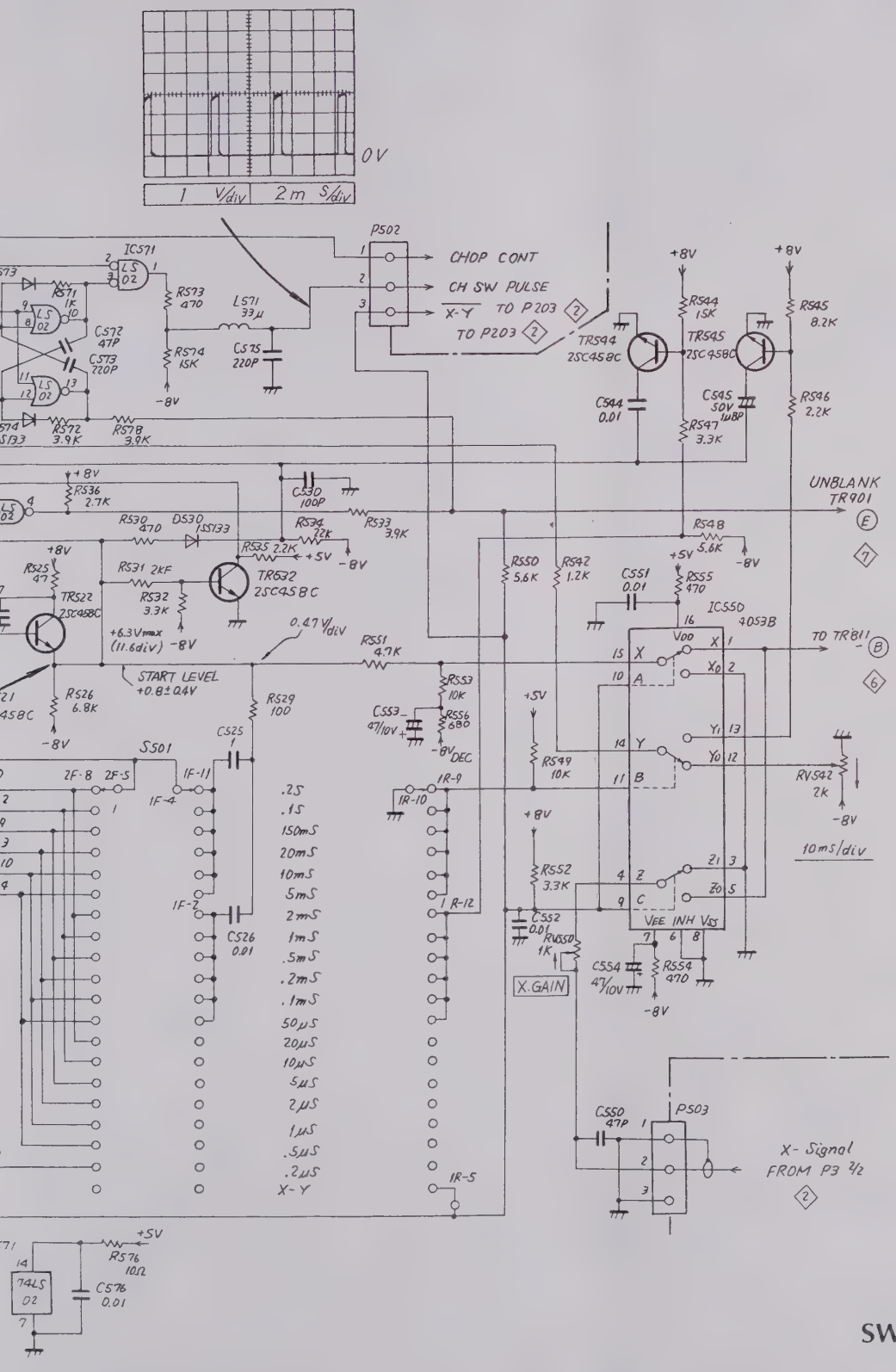
TRIG GEN ④


SWEEP VAR
+5V
+8V
-8V
-5.9V
RS01 10
CS01 0.01
IC502
RS02 1K
RS09 2.2K
TRS03 2SA1029D
RS04 47K
IC501 74LS74
FROM IC401
RS03 4.7K
RS05 3.3K
RS06 47K
CS05 1P
RS07 10K
RS08 10
AUTO FROM S403-6
CS08 0.01
CS10 0.01
RS10 47
RS11 8.2K
TRS14 2SC458C
T = 90mS
+1.2V~+2.7V
CS11 22/25V
RS14 1.5K
RS15 15K
0.42mA
+1.2V
RS40 560
RVS40 2K
RS41 390
DS41 1SS133
DS20 MA161
CS20 82P
~40P CVS20
RS20 2.2K
RS19 2.2K
DS21 MA161
0.8±0.4V
DS22 MA161
RS21 47K
DS01 1SS133
CS19 4.7/10V
TRS20 2SK304E
RS22 270
RS23 4.7K
CS28 47/10V
DS36 1SS133
0V
1V/div 2mS/div



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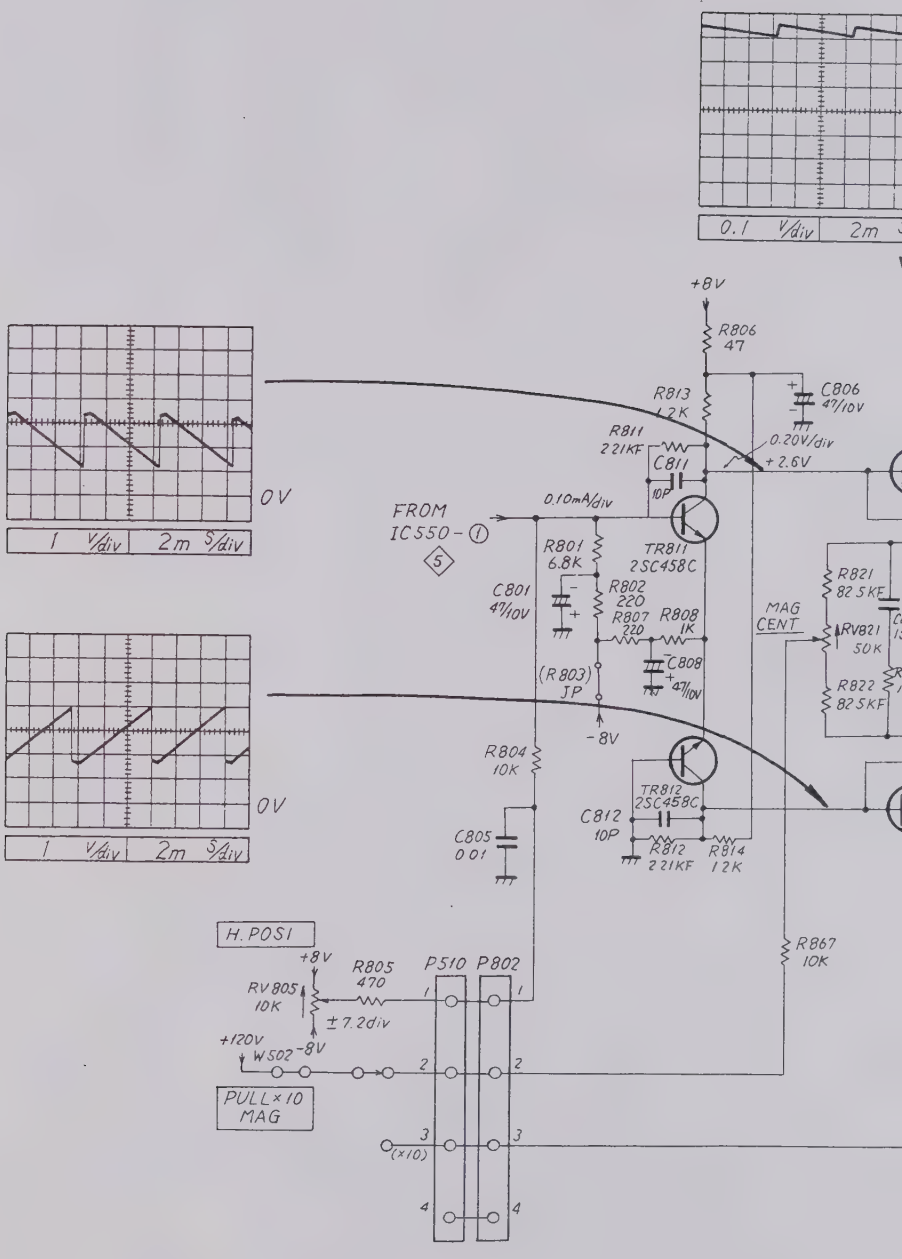
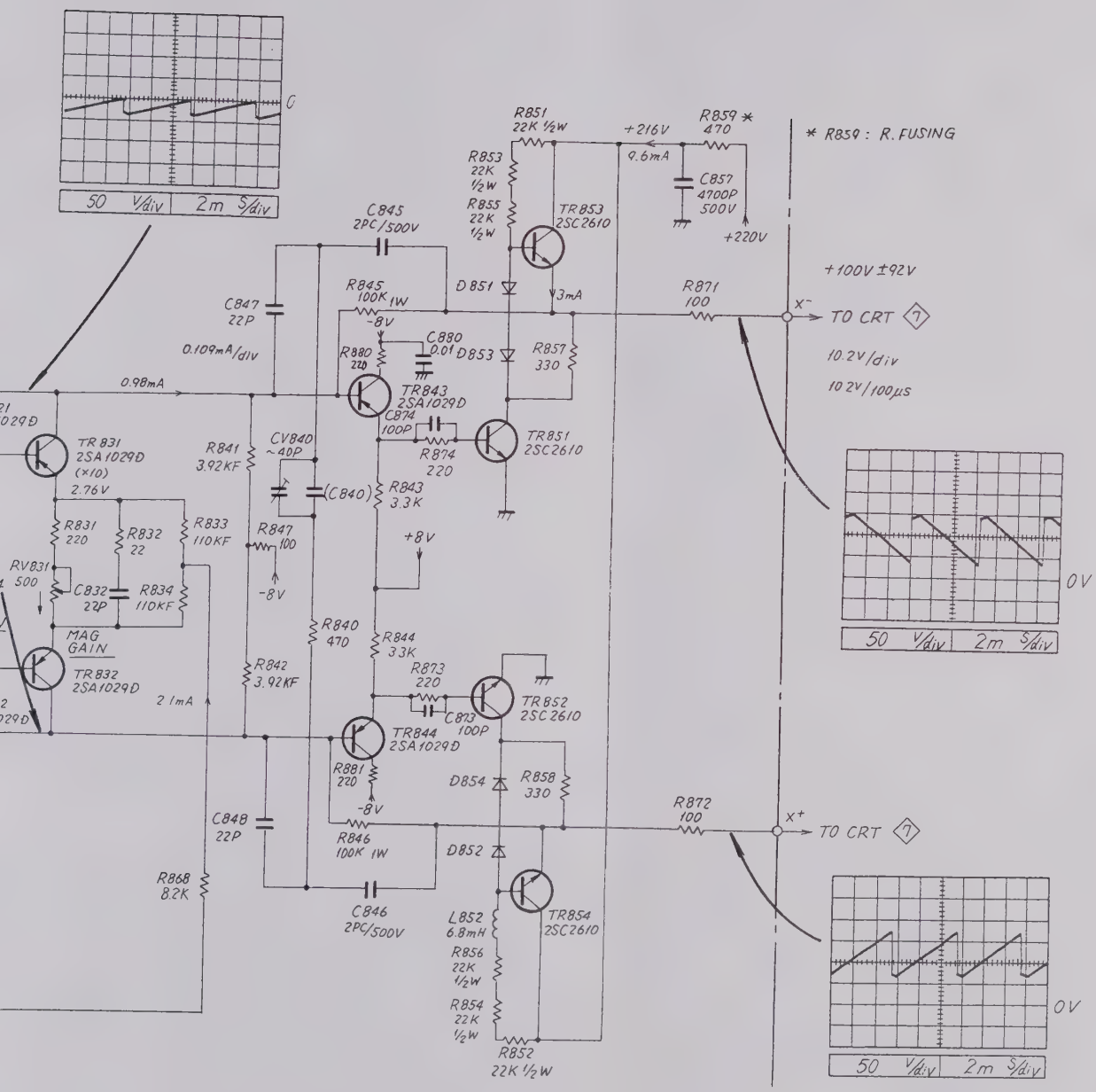
SWEEP GEN ⑤


0.1 V/div 2m
+8V
R806 47
R813 1.2K
C806 47/10V
R811 221KF
C811 10P
0.20V/div
+2.6V
0V
1 V/div 2m S/div
FROM IC550-①
5
0.10mA/div
R801 6.8K
TR811 2SC458C
C801 47/10V
R802 220
R807 220
R808 1K
C808 47/10V
(R803) JP
-8V
R821 82.5KF
MAG CENT
RV821 50K
R822 82.5KF
R804 10K
TR812 2SC458C
C812 10P
C805 0.01
R812 221KF
R814 1.2K
R867 10K
H. POSI
+8V
R805 470
RV805 10K
±7.2div
+120V
W502
-8V
P510
P802
PULL×10 MAG
(×10)


50 V/div 2m S/div
R851 22K 1/2W
+216V
9.6mA
R859 * 470
* R859 : R. FUSING
R853 22K 1/2W
R855 22K 1/2W
TR853 2SC2610
C857 4700P 500V
+220V
C845 2PC/500V
+100V±92V
C847 22P
R845 100K 1W
-8V
D851
3mA
R871 100
X⁻
TO CRT 7
0.109mA/div
C880 0.01
R880 220
D853
R857 330
10.2V/div
10.2V/100μs
0.98mA
TR843 2SA1029D
C874 100P
TR851 2SC2610
R874 220
TR831 2SA1029D (×10)
2.76V
R841 3.92KF
CV840 ~40P
(C840)
R843 3.3K
R831 220
R832 22
R833 110KF
R847 100
+8V
RV831 500
C832 22P
R834 110KF
-8V
OV
50 V/div 2m S/div
MAG GAIN
R840 470
R844 3.3K
TR832 2SA1029D
R842 3.92KF
R873 220
TR852 2SC2610
C873 100P
2.1mA
TR844 2SA1029D
R881 220
D854
R858 330
-8V
R872 100
X⁺
TO CRT 7
C848 22P
R846 100K 1W
D852
R868 8.2K
C846 2PC/500V
TR854 2SC2610
L852 6.8mH
R856 22K 1/2W
R854 22K 1/2W
R852 22K 1/2W
OV
50 V/div 2m S/div

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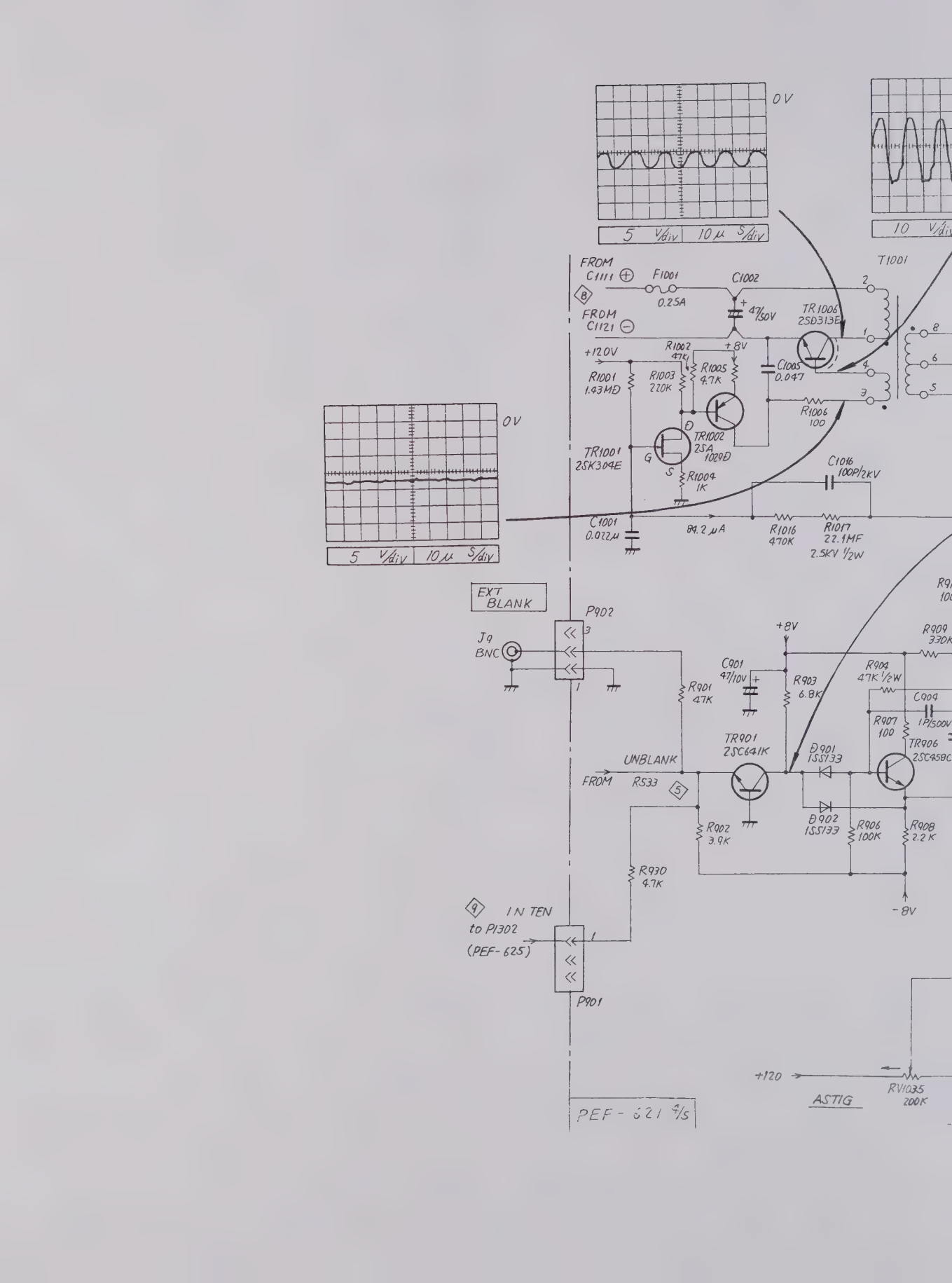
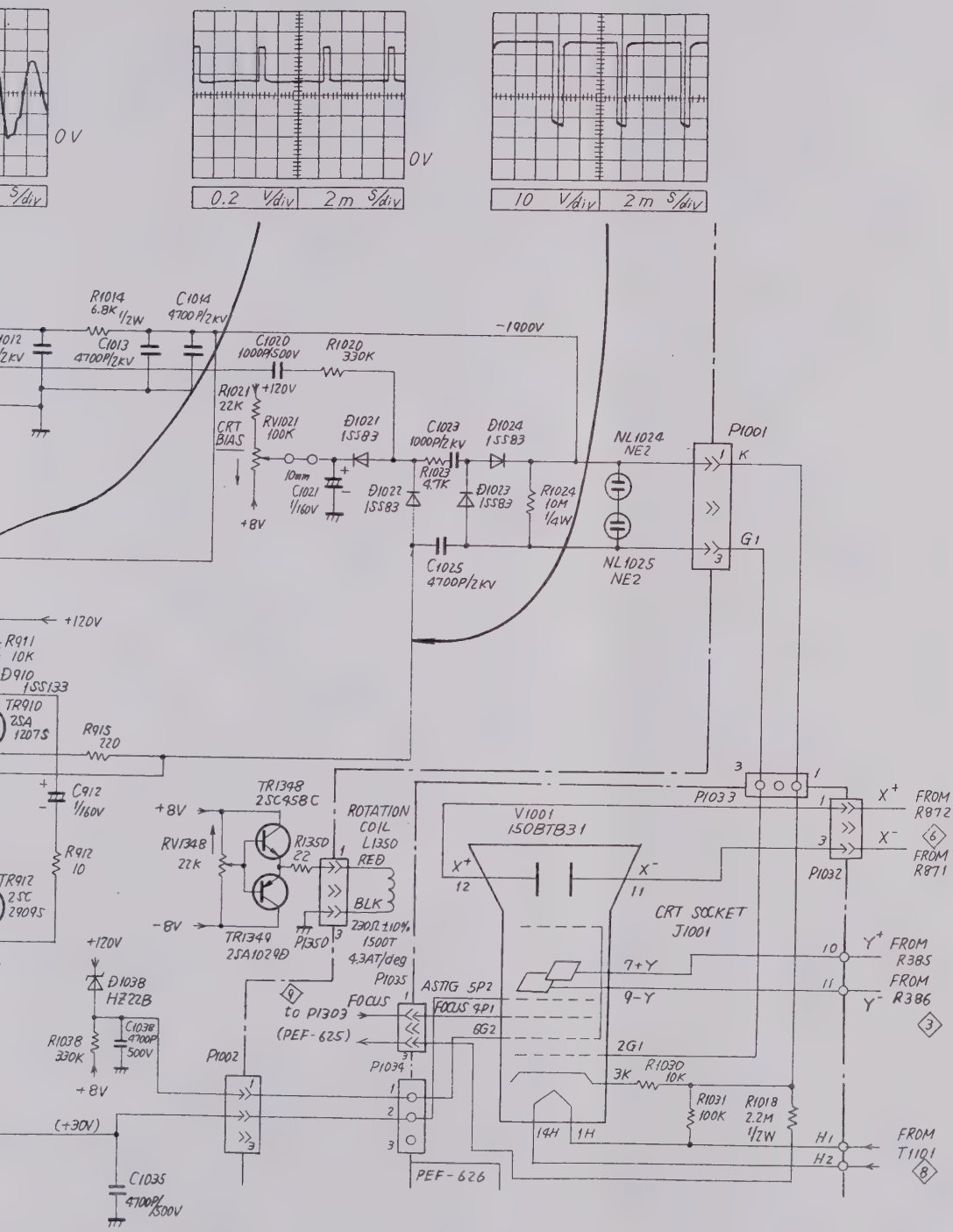
H AMP ⑥


0V
5 V/div 10 μ S/div
10 V/div
FROM C1111 ⊕
FROM C1121 ⊖
F1001
0.25A
C1002
47/50V
T1001
TR1006 2SD313E
+12.0V
+8V
R1002 47K
R1001 1.43MΩ
R1003 220K
R1005 4.7K
C1005 0.047
R1006 100
TR1001 2SK304E
TR1002 2SA 1029Θ
R1004 1K
C1016 100P/2KV
C1001 0.022μ
89.2 μA
R1016 470K
R1017 22.1MF 2.5KV 1/2W
EXT BLANK
P902
J9 BNC
R901 47K
C901 47/10V
R903 6.8K
R909 330K
R904 47K 1/2W
C904
R907 100
TR906 2SC458C
TR901 2SC641K
Θ901 1SS133
UNBLANK
FROM RS33
Θ902 1SS133
R902 3.9K
R906 100K
R908 2.2K
R930 4.7K
-8V
IN TEN
to PI302
(PEF-625)
P901
+12Ω
RV1035 200K
ASTIG
PEF-621 4/5



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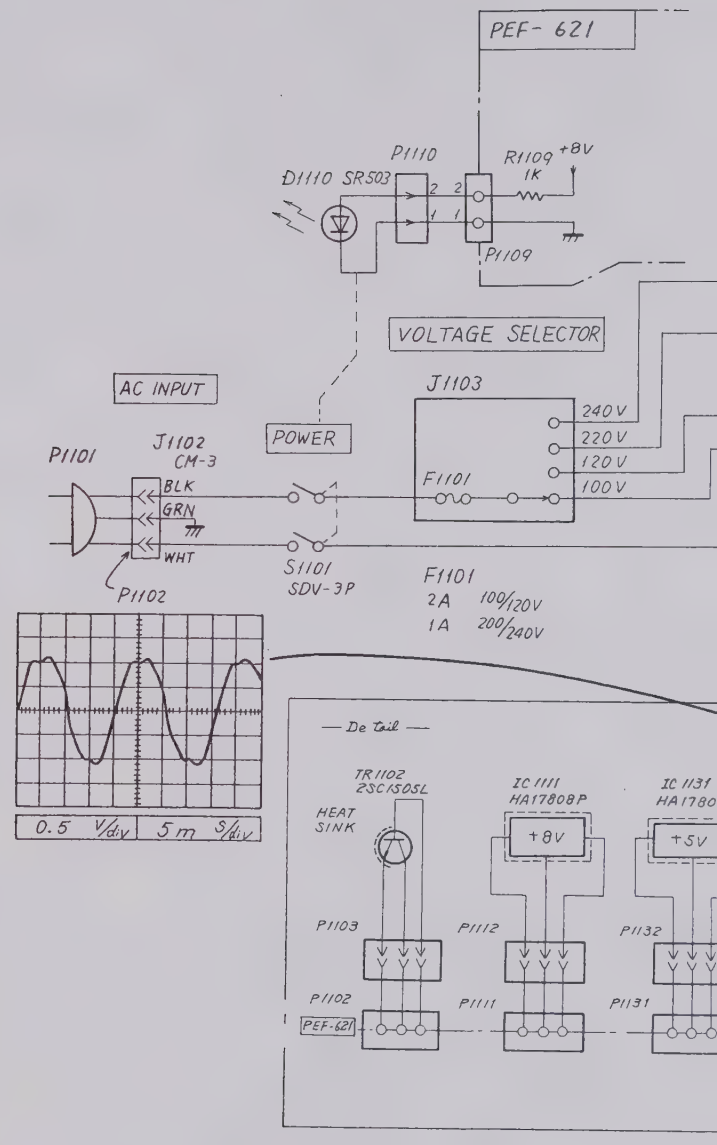
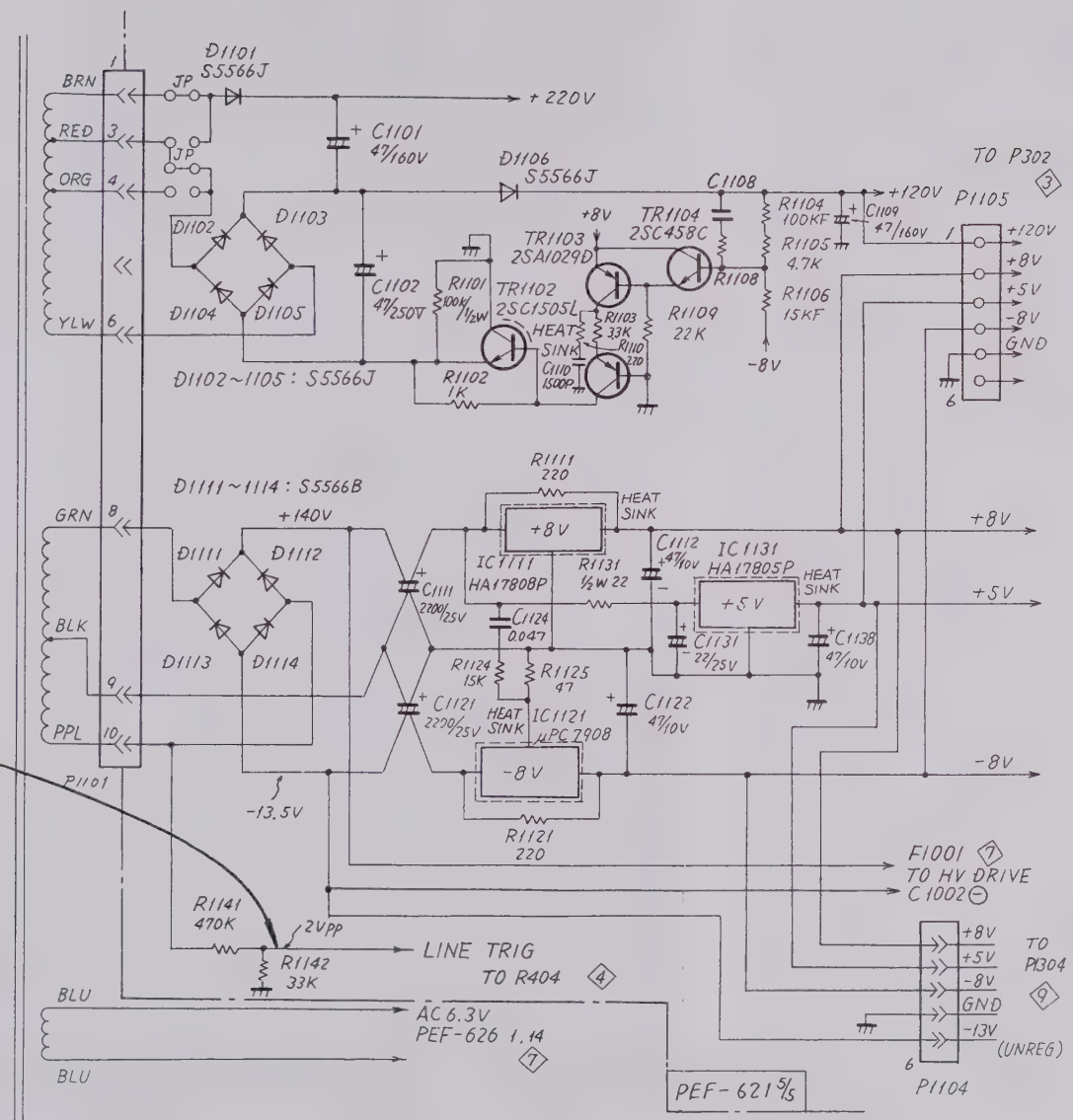
HV & Z AMP ⑦


PEF-621
P1110
D1110 SR503
R1109 1K
+8V
P1109
VOLTAGE SELECTOR
AC INPUT
J1103
240V
220V
120V
100V
POWER
P1101
J1102 CM-3
BLK
GRN
WHT
F1101
P1102
S1101 SDV-3P
F1101
2A 100/120V
1A 200/240V
0.5 V/div
5m S/div
— De tail —
TR1102 2SC1505L
HEAT SINK
IC1111 HA17808P
+8V
IC1131 HA1780
+5V
P1103
P1112
P1132
P1102
PEF-621
P1111
P1131



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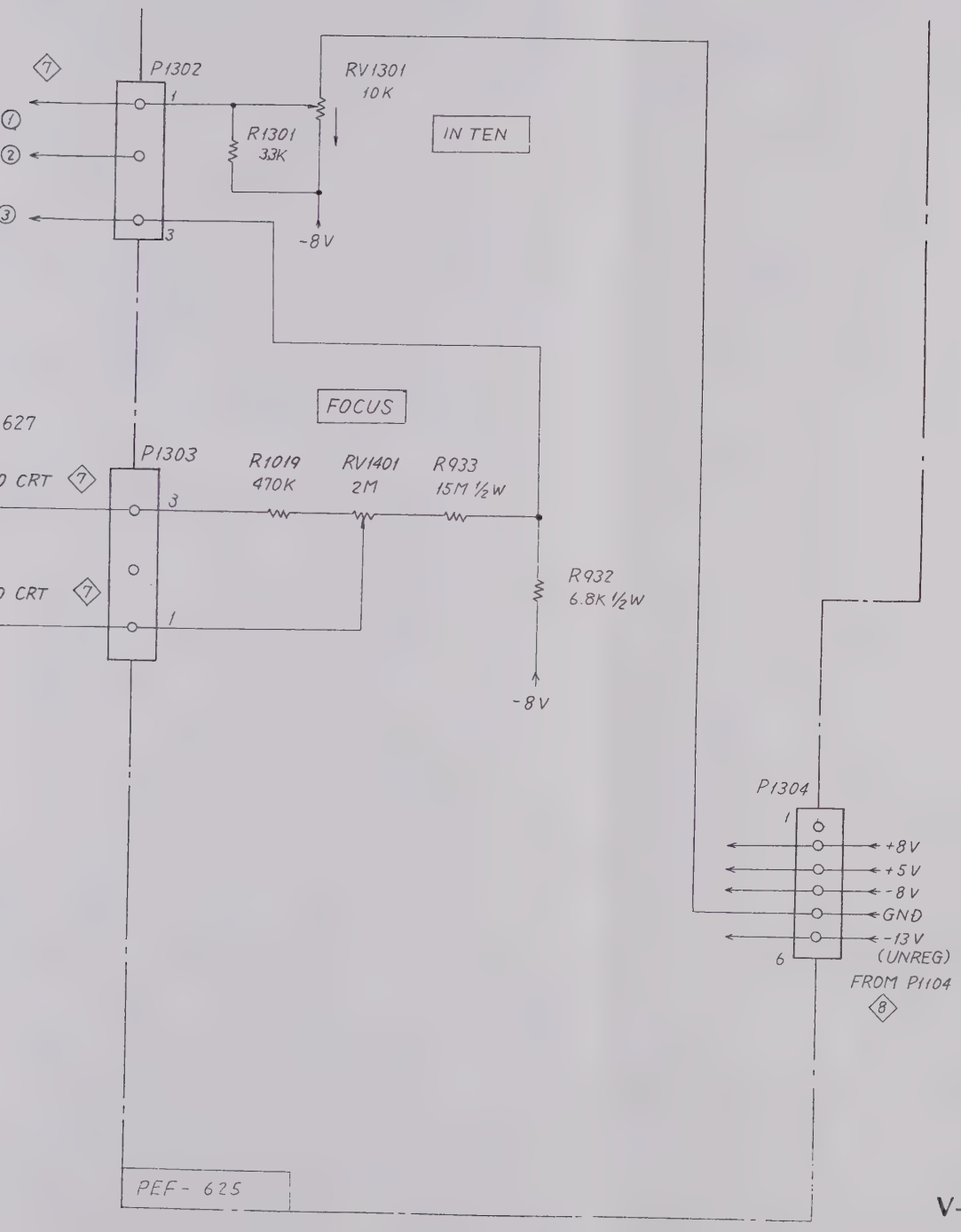
POWER SUPPLY ⑧



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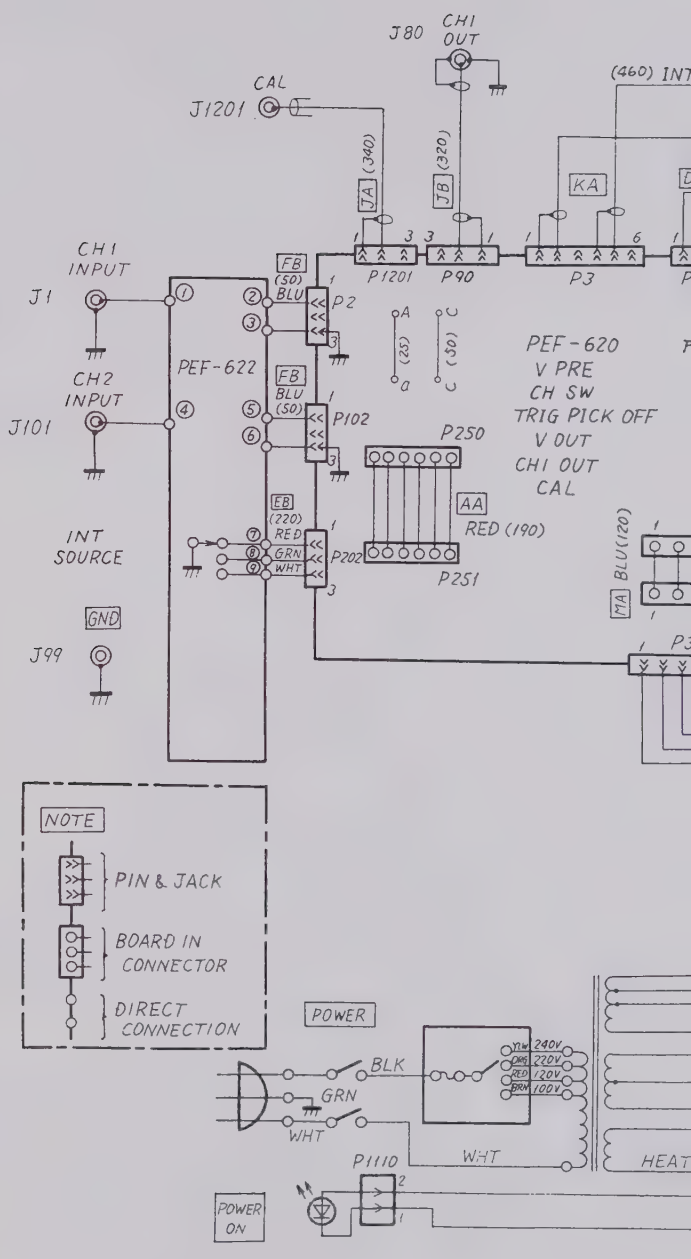
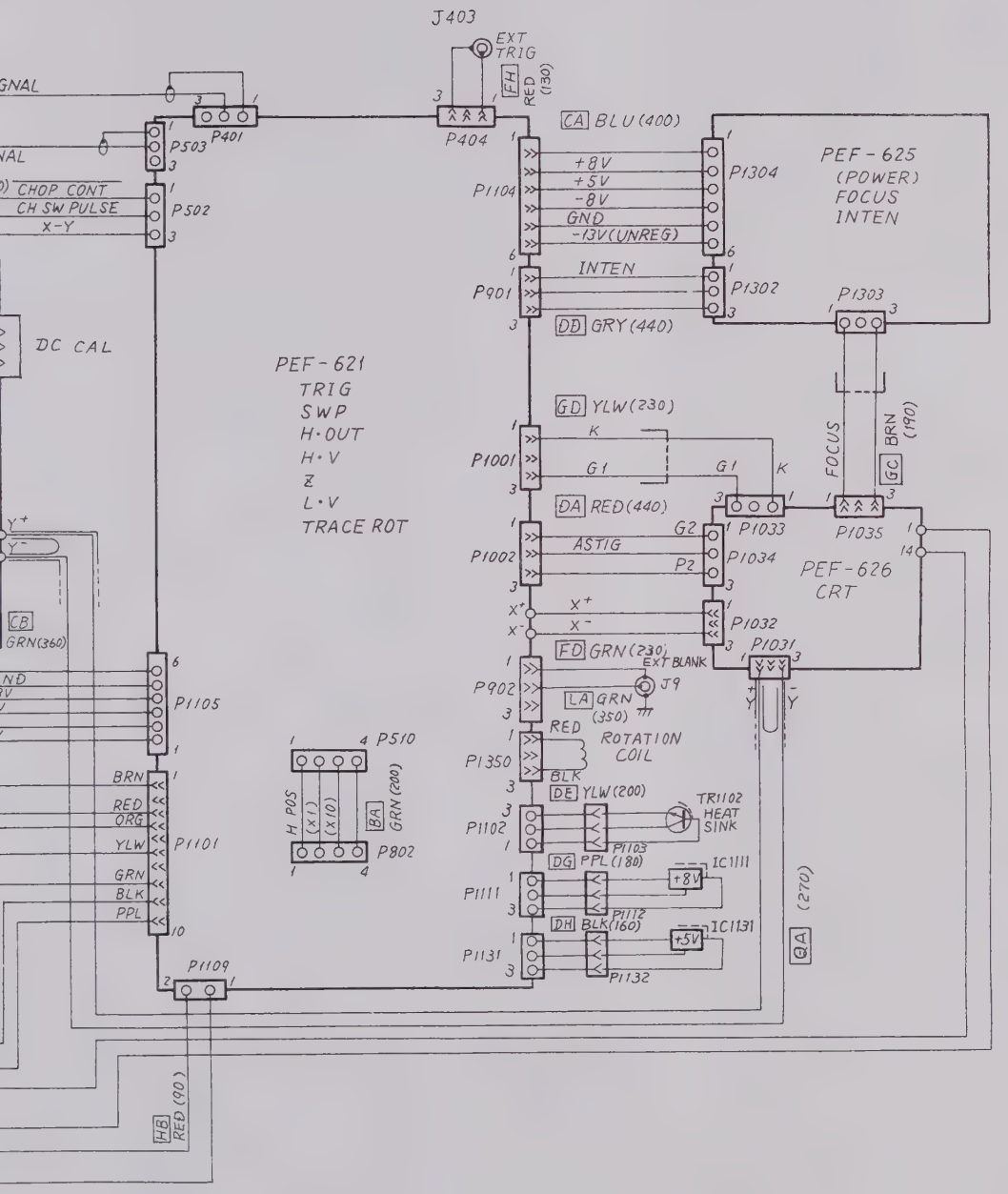
RV/LAMP ⑨


J80
CH1 OUT
CAL
J1201
(460) INT
JA (340)
JB (320)
KA
CH1 INPUT
J1
FB (50) BLU
P2
P1201
P90
P3
PEF-622
CH2 INPUT
J101
P102
P250
PEF-620
V PRE
CH SW
TRIG PICK OFF
V OUT
CH1 OUT
CAL
EB (220)
RED
GRN
WHT
P202
AA
RED (190)
P251
INT SOURCE
GND
J99
MA BLU (120)
NOTE
PIN & JACK
BOARD IN CONNECTOR
DIRECT CONNECTION
POWER
BLK
GRN
WHT
240V
220V
120V
100V
P1110
WHT
HEAT
POWER ON



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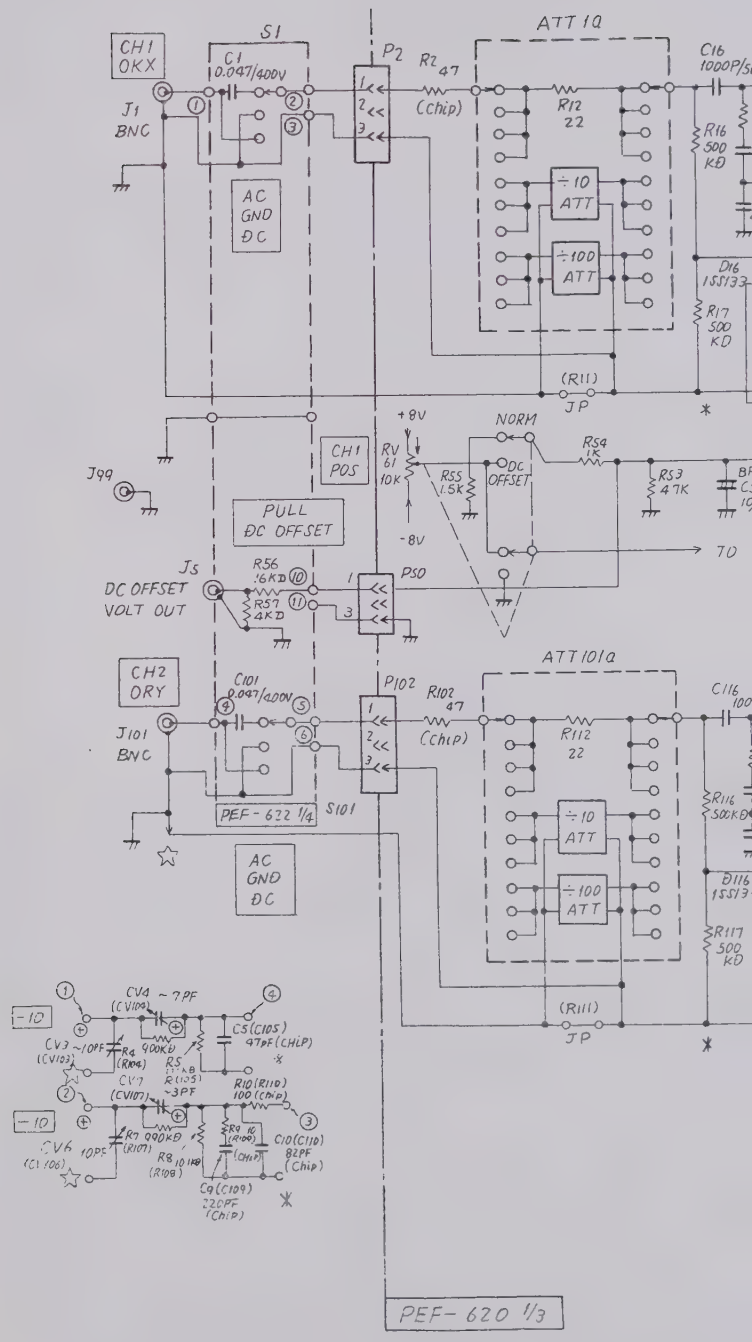
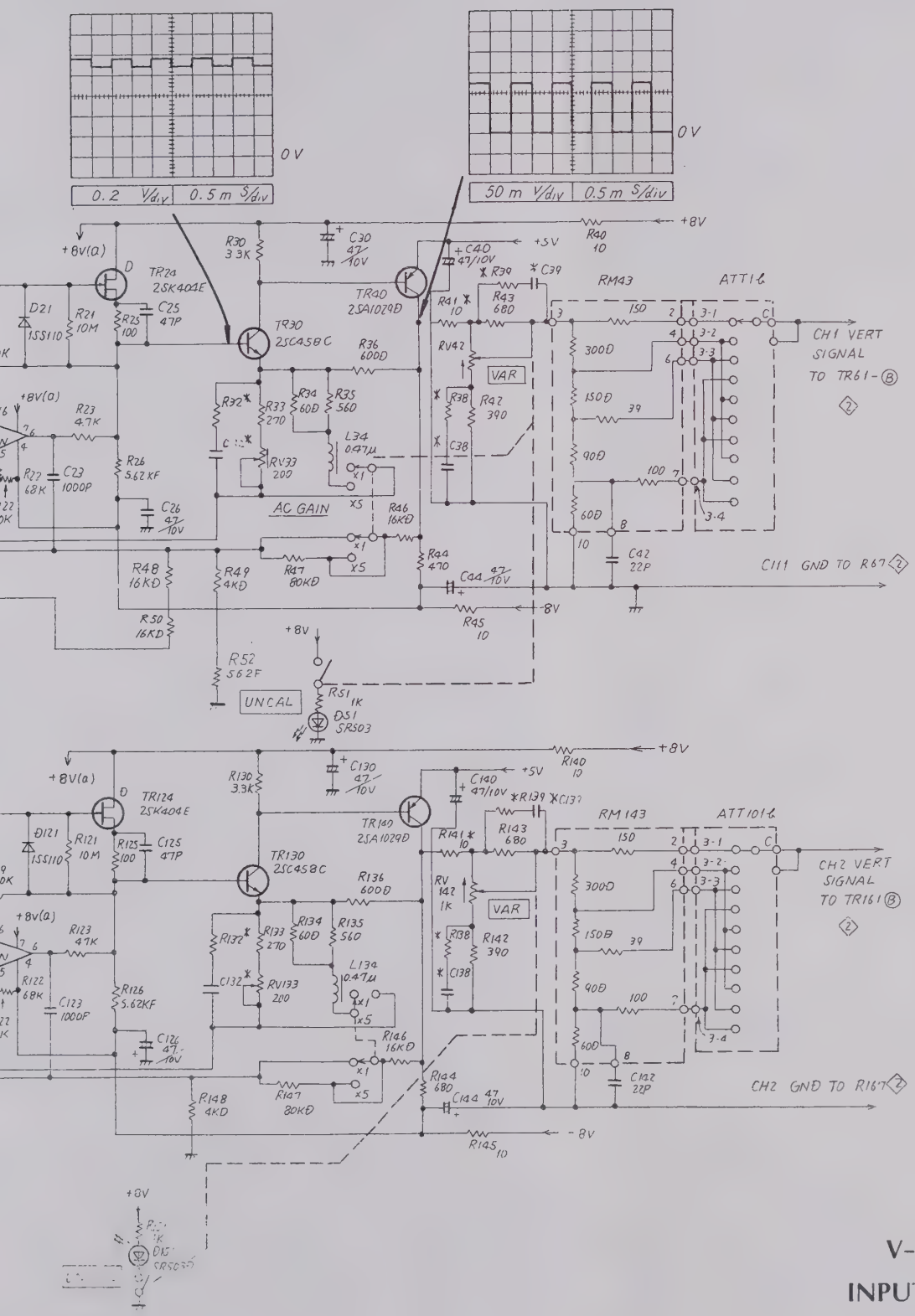
WIRING DIAGRAM


CH1 OKX
J1 BNC
S1
C1 0.047/400V
AC GND DC
P2
R2 47 (Chip)
ATT 1Q
R12 22
÷10 ATT
÷100 ATT
C16 1000P/
R16 500 KΩ
D16 1S5133
R17 500 KΩ
(R11)
JP
CH1 POS
J99
PULL DC OFFSET
+8V
-8V
RV 61 10K
NORM
DC OFFSET
RS4 1K
RS5 1.5K
RS3 47K
TO
J5
DC OFFSET VOLT OUT
R56 1.6KΩ
R57 4KΩ
PS0
CH2 ORY
J101 BNC
C101 0.047/400V
P102
R102 47 (Chip)
ATT 101Q
R112 22
PEF-622 1/4
S101
AC GND DC
C116
R116 500KΩ
D116 1S5133
R117 500 KΩ
(R111)
JP
-10
CV4 ~7PF (CV104)
CV3 ~10PF (CV103)
R4 900KΩ (R104)
R5 1.8 (R105)
CV7 ~3PF (CV107)
C5(C105) 47PF(CHIP)
R10(R110) 100 (Chip)
R9 1K (R109)
C10(C110) 82PF (Chip)
R7 900KΩ (R107)
CV6 10PF (CV106)
R8 10.1KΩ (R108)
C9(C109) 220PF (Chip)
PEF-620 1/3



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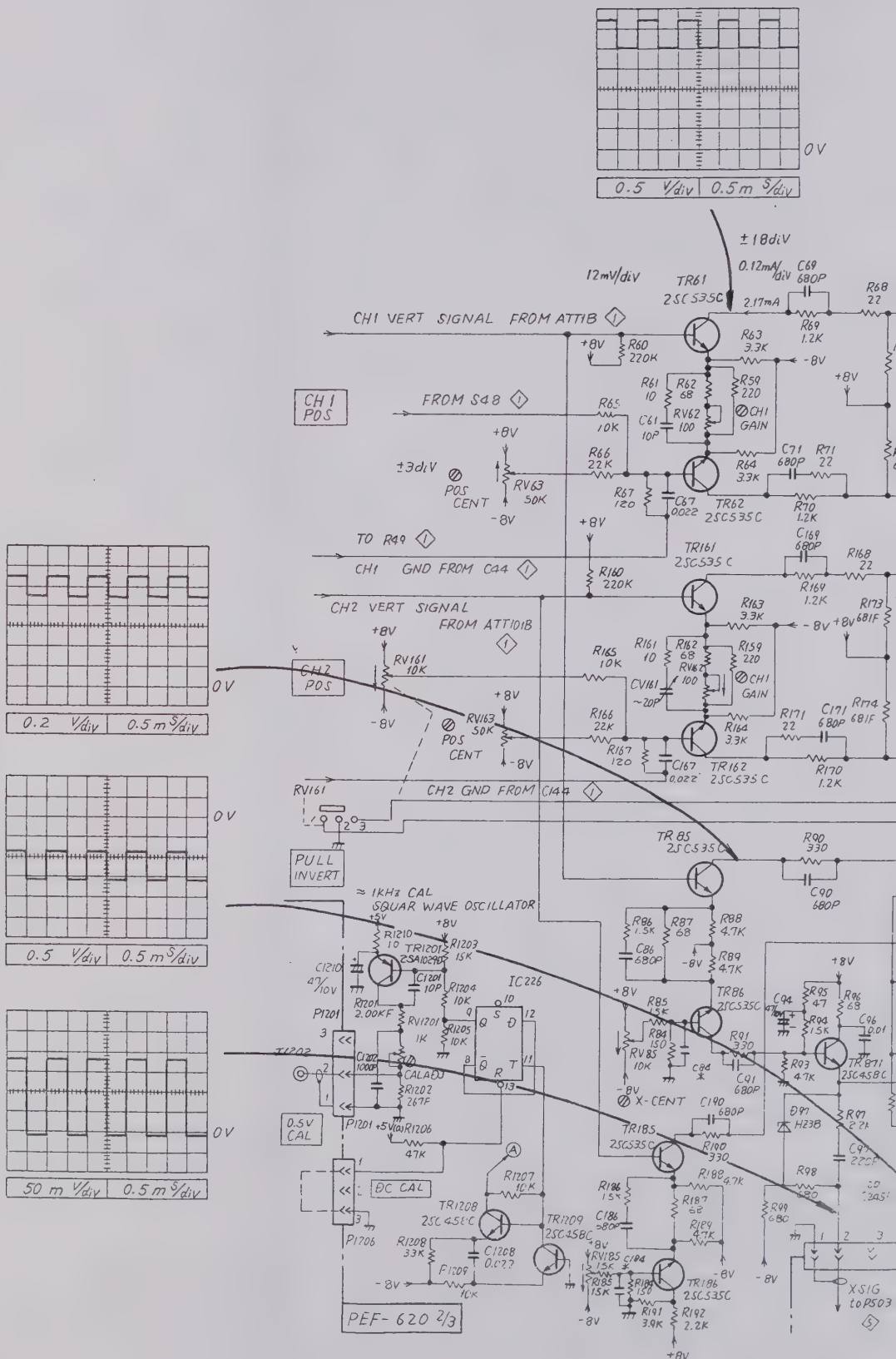
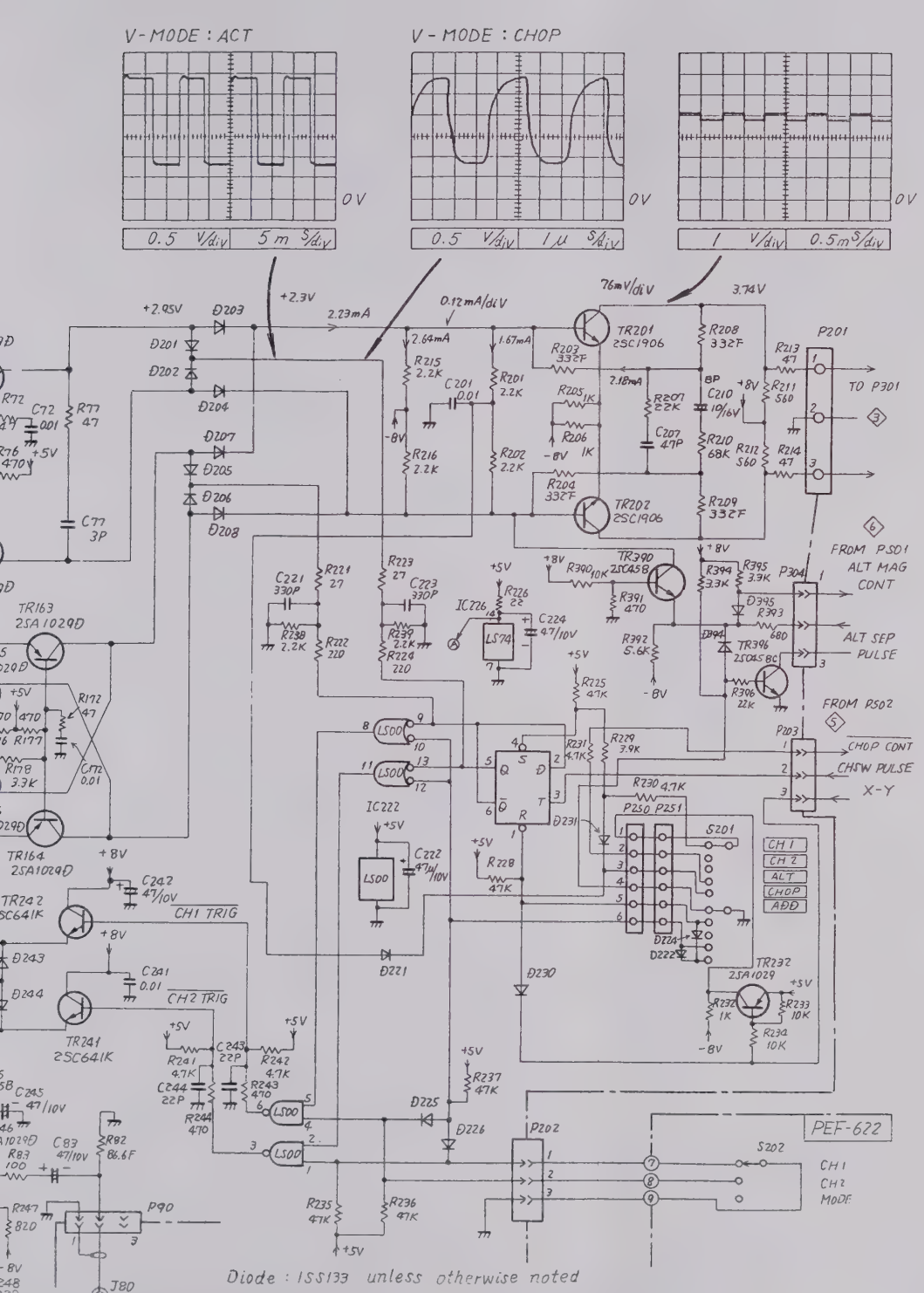
INPUT AMP ①


0V
0.5 V/div 0.5m S/div
±18div
0.12mA/div
12mV/div
TR61 2SC535C
2.17mA
C69 680P
R68 22
R69 1.2K
CH1 VERT SIGNAL FROM ATT1B
R60 220K
R63 3.3K
+8V
-8V
R61 10
R62 68
RV62 100
R59 220
CH1 GAIN
CH1 POS
FROM S48
R65 10K
C61 10P
±3div
POS CENT
RV63 50K
R66 22K
R67 120
C67 0.022
TR62 2SC535C
C71 680P
R71 22
R64 3.3K
R70 1.2K
TO R49
CH1 GND FROM C44
TR161 2SC535C
C169 680P
R168 22
R169 1.2K
R160 220K
CH2 VERT SIGNAL FROM ATT101B
R163 3.3K
R173 681F
R161 10
R162 68
RV162 100
R159 220
CV161 ~20P
R165 10K
CH2 POS
RV161 10K
RV163 50K
R166 22K
R167 120
C167 0.022
TR162 2SC535C
R164 3.3K
R171 22
C171 680P
R174 681F
R170 1.2K
CH2 GND FROM C144
PULL INVERT
TR85 2SC535C
R90 330
C90 680P
≈1KHz CAL SQUAR WAVE OSCILLATOR
R1210 10
TR1201 2SA1029GR
R1203 15K
C1210 47/10V
C1201 10P
R1204 10K
IC226
R1201 2.00KF
RV1201 1K
R1205 10K
P1201
C1202 1000P
CALADJ
R1202 267F
R1206 47K
0.5V CAL
DC CAL
P1206
R1207 10K
TR1208 2SC458C
TR1209 2SC458C
R1208 33K
C1208 0.022
P1209 10K
R86 1.5K
R87 68
R88 4.7K
C86 680P
R89 4.7K
TR86 2SC535C
R85 1.5K
RV85 10K
R84 150
C84
C91 680P
X-CENT
C190 680P
TR185 2SC535C
R190 330
R188 4.7K
R186 1.5K
R187 68
C186 680P
R184 4.7K
RV185 1.5K
C184
R185 1.5K
R189 150
TR186 2SC535C
R191 3.9K
R192 2.2K
R95 47
R96 68
C94 47
R94 1.5K
C96 0.01
TR87 2SC458C
R93 4.7K
D97 HZ3B
R97 2.2K
C97 220P
R98 680
R99 680
XSIG to P503
PEF-620 2/3



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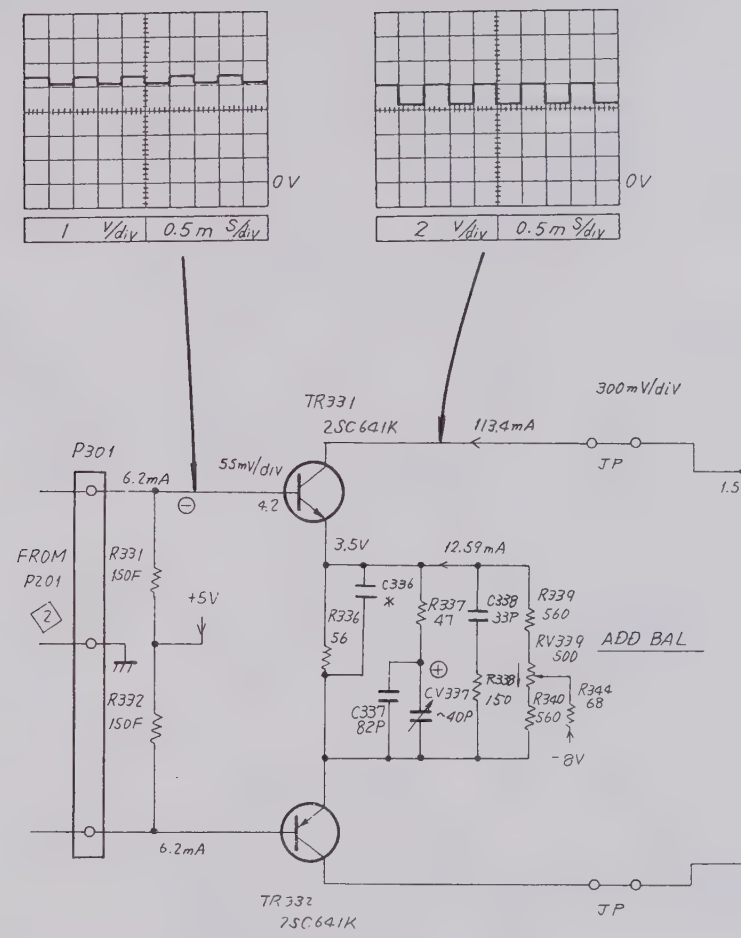
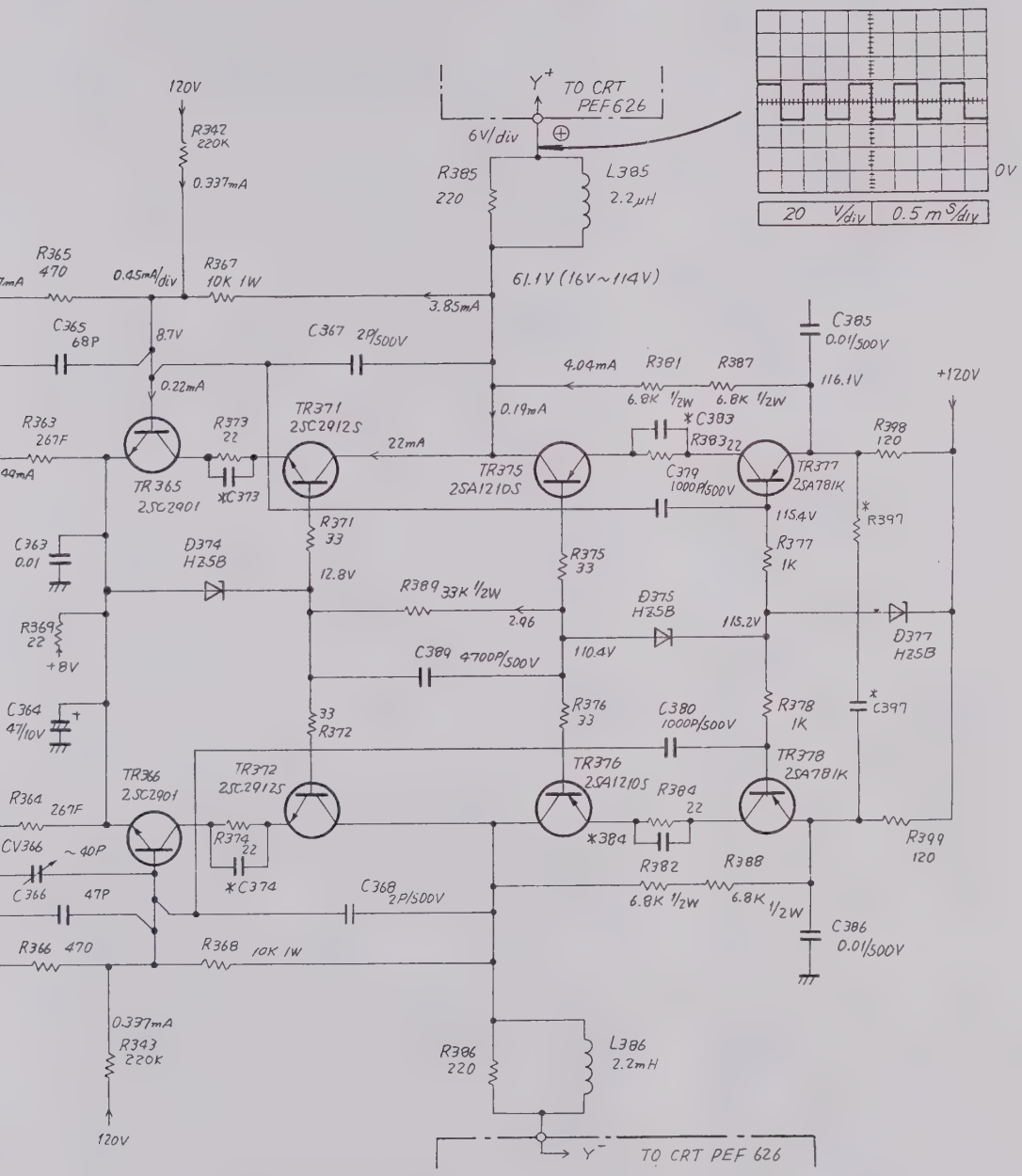
VERT PREAMP TRIG PICKOFF & CH SW MULTI ②


0V
1 V/div
0.5m S/div
0V
2 V/div
0.5m S/div
TR331
2SC641K
300mV/div
113.4mA
JP
P301
6.2mA
55mV/div
4.2
3.5V
12.59mA
FROM
P201
2
R331
150F
+5V
R332
150F
C336
*
R336
56
R337
47
C338
33P
R339
560
RV339
500
ADD BAL
R338
150
CV337
~40P
C337
82P
R340
560
R344
68
-8V
6.2mA
TR332
2SC641K
JP
P302
120V
8V
5V
-8V
GND
FROM
P1105
8
+120V
+8V
+5V
-8V
GND
C301
1μ/160V
C302
47/10V
C303
47/10V
C304
47/10V
C271
47μ/10V
C305
47/10V
C271
47μ/10V


120V
R342 220K
0.337mA
R365 470
0.45mA/div
R367 10K 1W
61.1V (16V~114V)
3.85mA
C365 68P
8.7V
C367 2P/500V
0.22mA
0.19mA
4.04mA
R381
R387
6.8K 1/2W
6.8K 1/2W
116.1V
C385 0.01/500V
+120V
R363 267F
R373 22
TR371 2SC2912S
22mA
*C383
R383 22
R398 120
TR365 2SC2901
*C373
TR375 2SA1210S
C379 1000P/500V
TR377 2SA781K
115.4V
*R397
R371 33
R375 33
R377 1K
C363 0.01
D374 HZ5B
12.8V
R389 33K 1/2W
2.96
D375 HZ5B
115.2V
D377 HZ5B
R369 22
+8V
110.4V
C389 4700P/500V
C364 47/10V
R376 33
C380 1000P/500V
R378 1K
*C397
33 R372
TR366 2SC2901
TR372 2SC2912S
TR376 2SA1210S
TR378 2SA781K
R364 267F
R384 22
*C384
R374 22
R399 120
CV366 ~40P
*C374
C366 47P
C368 2P/500V
R382
R388
6.8K 1/2W
6.8K 1/2W
C386 0.01/500V
R366 470
R368 10K 1W
0.337mA
R343 220K
120V
R386 220
L386 2.2mH
Y- TO CRT PEF 626
Y+ TO CRT PEF626
6V/div
R385 220
L385 2.2μH
0V
20 V/div
0.5 mS/div

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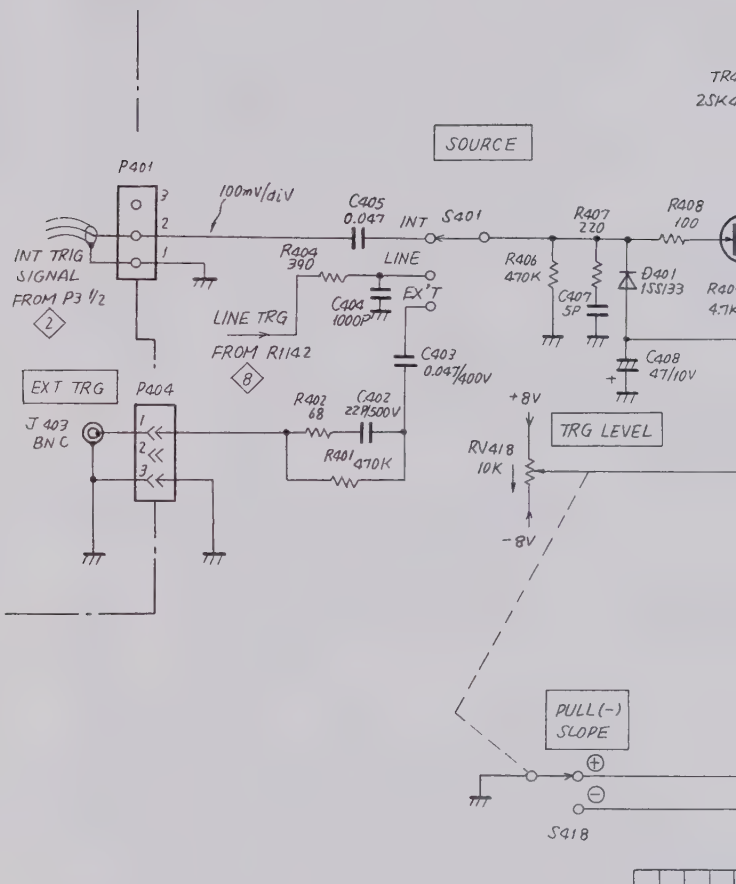
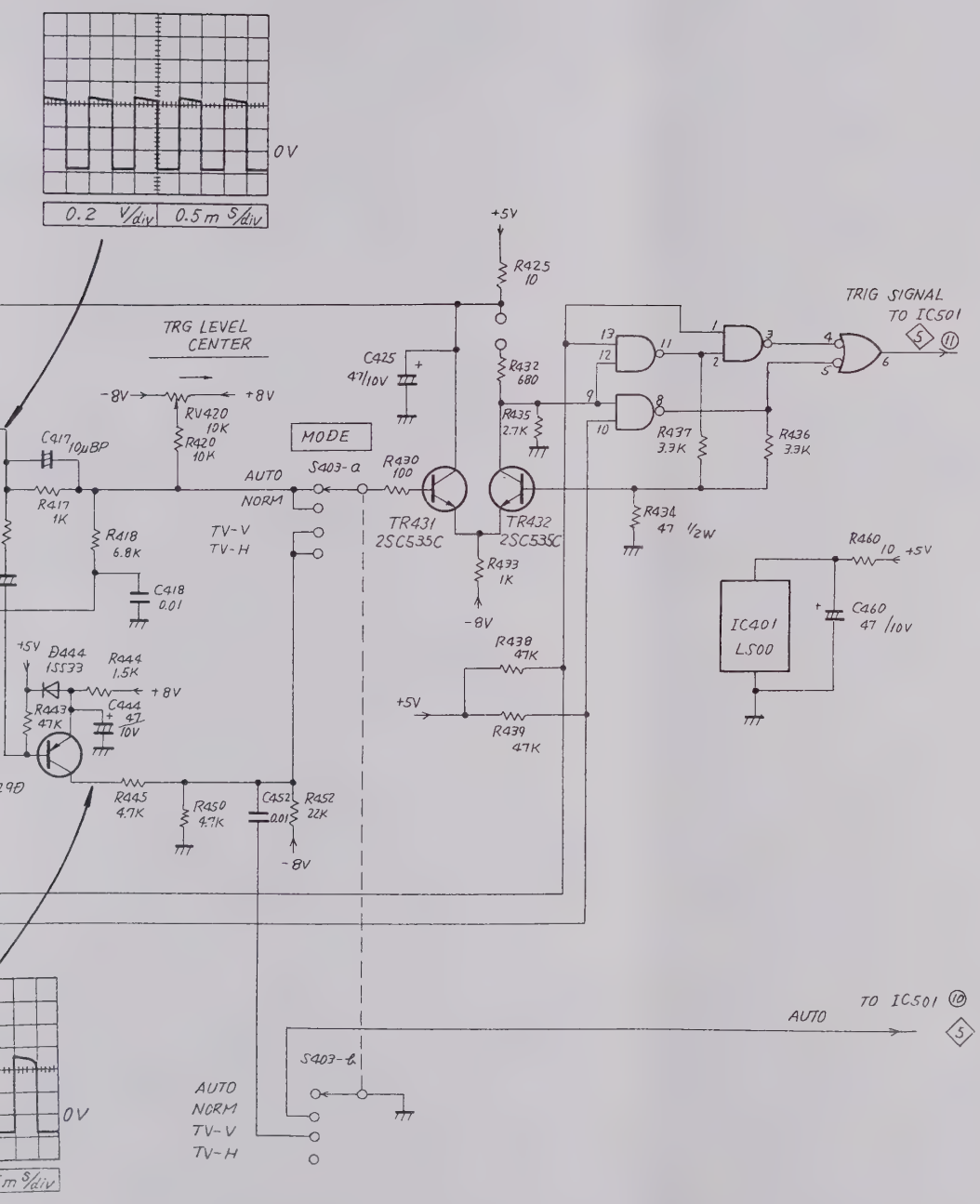
V OUT ③


SOURCE
P401
100mV/diV
C405
0.047
INT
S401
R407
220
R408
100
INT TRIG
SIGNAL
FROM P3 1/2
2
R404
390
LINE
R406
470K
C407
SP
D401
1SS133
C404
1000P
EXT
LINE TRG
FROM R1142
8
C403
0.047/400V
C408
47/10V
EXT TRG
P404
J403
BNC
R402
68
C402
22P/500V
+8V
TRG LEVEL
RV418
10K
R401
470K
-8V
PULL(-)
SLOPE
S418
2 V/



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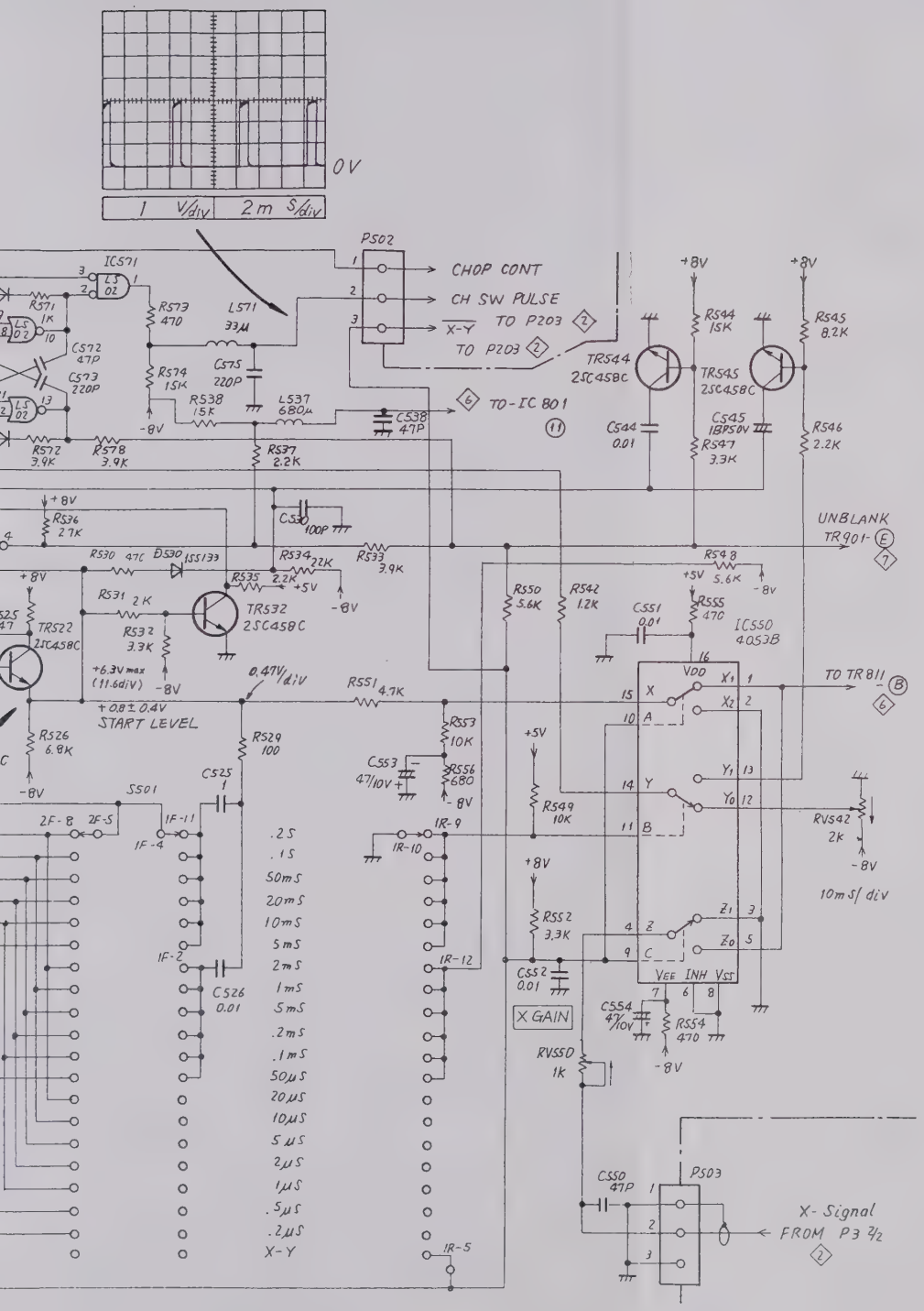
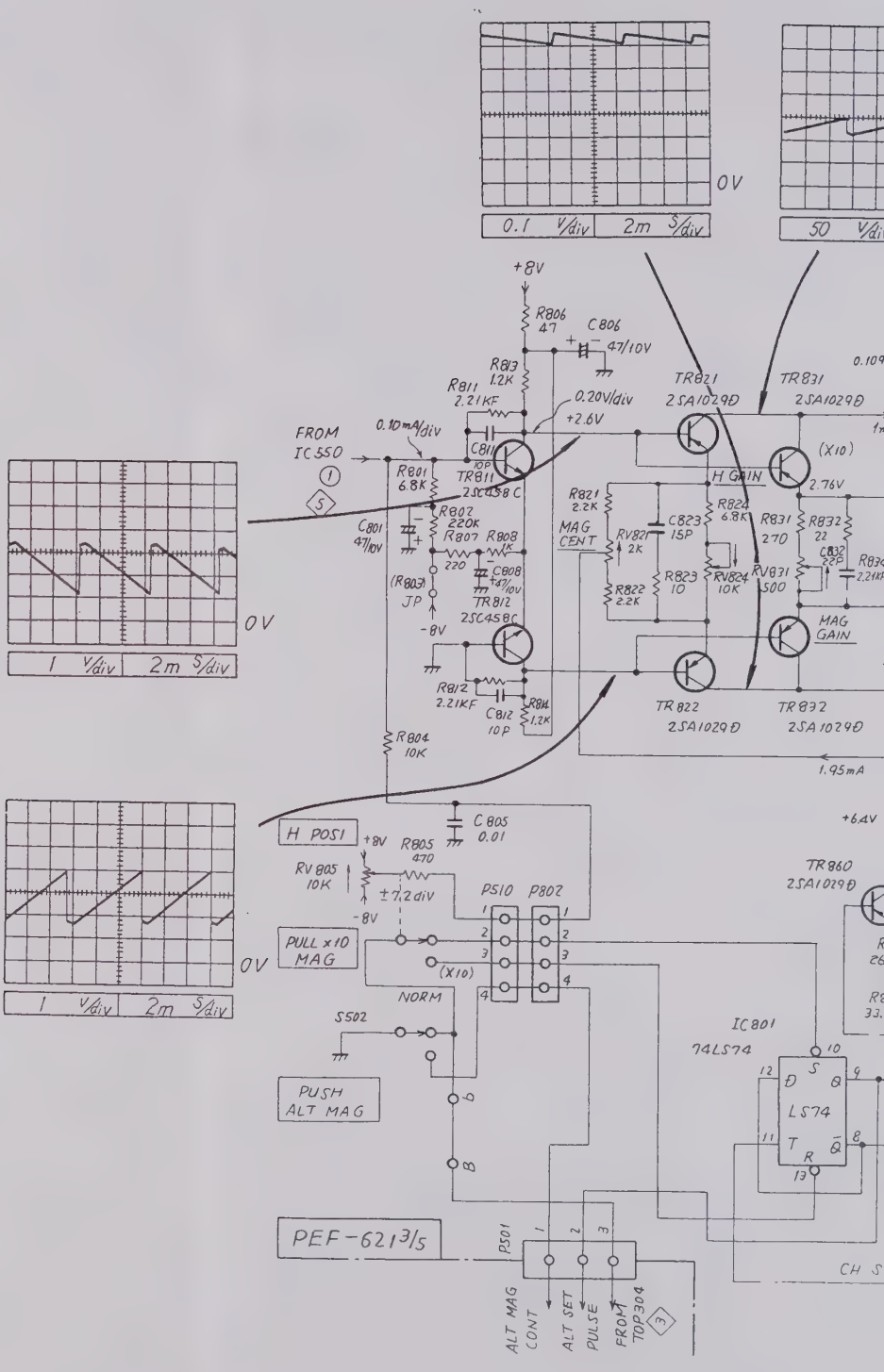
TRIG GEN ◇4

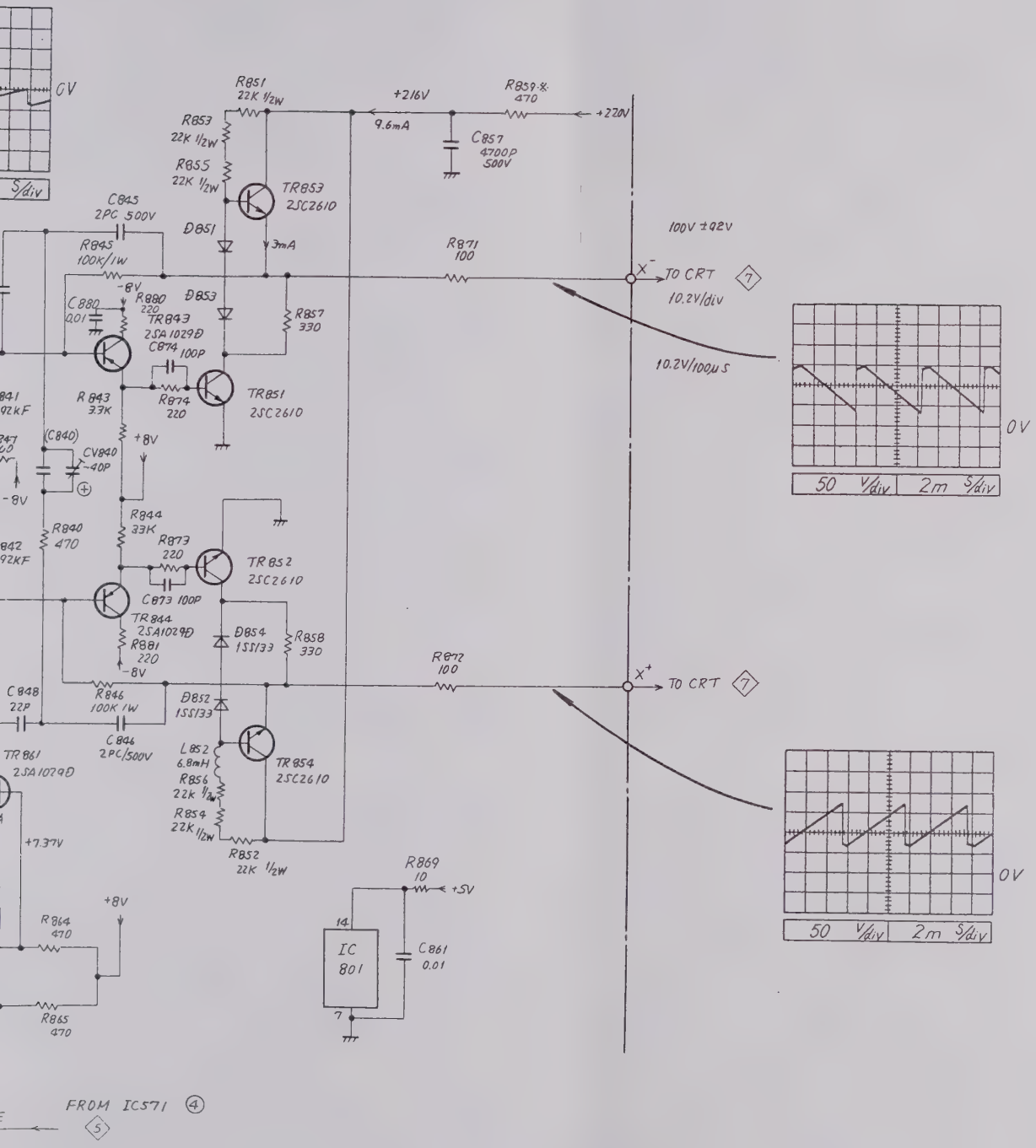
0V
1 V/div 2 m S/div
+5V
RS01 10
C501 0.01
IC502
RS07 10K
+8V
TR503 2SA1020D
SWEEP VAR
RS40 560
RVS40 2K
DS43 RED SR5031
UNCAL
RS41 390
DS41 1SS133
RS43 1K -8
-8V
-5.9V
DS71 1SS133
DS72 1SS133
C571 0.01
RS02 1K
RS09 2.2K
LS 03P
+4.5V~0.2V
DS36 1SS133
RS04 47K
IC501 74LS74
FROM IC401
RS03 4.7K
DS20 MA161
CS20 82P
~40P CVS20
RS20 2.2K
RS19 2.2K
DS21 MA161
+0.8±0.4V
TR520 2SK304E
RS24 100K
CS21 8P
RS22 270
RS23 4.7K
RS05 3.3K
CS05 1P
RS06 47K
RS21 47K
DS22 MA161
DS01 1SS133
CS19 47μ/10V
RS08 10
AUTO FROM S403-8
CS08 0.01
CS10 0.01
RS10 47
RS13 8.2K
TR514 2SC458C
T=90mS
+1.2V~+2.7V
CS11 22/25V
RS14 1.5K
RS15 15K
0.42A
RS27 10M
RS28 1.5M
CS28 47μ/10V
IC571 74LS 02
RS76 10
C576 0.01

PEF-621 2/5



V-222
SWEEP GEN ⑤


0V
0.1 V/div 2m S/div
50 V/div
+8V
R806 4.7
C806 47/10V
R813 1.2K
R811 2.21KF
0.20V/div
+2.6V
FROM IC550
0.10mA/div
C811 10P
TR811 2SC458C
R801 6.8K
R807 220K
R808 1K
220
C808 47/10V
(R803) JP
TR812 2SC458C
-8V
R812 2.21KF
C812 10P
R814 1.2K
R804 10K
C801 47/10V
0V
1 V/div 2m S/div
TR821 2SA1029Đ
TR831 2SA1029Đ
(X10)
H GAIN
2.76V
R821 2.2K
C823 15P
R824 6.8K
R831 270
R832 22
C832 22P
R834 2.21KF
MAG CENT
RV821 2K
R823 10
RV824 10K
RV831 500
R822 2.2K
MAG GAIN
TR822 2SA1029Đ
TR832 2SA1029Đ
1.95mA
0V
1 V/div 2m S/div
H POSI
+8V
R805 470
C805 0.01
RV805 10K
±7.2div
-8V
PULL x10 MAG
(X10)
NORM
S502
PUSH ALT MAG
PS10 P802
+6.4V
TR860 2SA1029Đ
IC801 74LS74
PEF-6213/5
P501
ALT MAG CONT
ALT SET
PULSE
FROM TOP304
CH S


R851 22K 1/2W
+216V
R859 470
+220V
9.6mA
C857 4700P 500V
R853 22K 1/2W
R855 22K 1/2W
TR853 2SC2610
D851
3mA
C845 2PC 500V
R845 100K/1W
-8V
C880 .001
R880 220
TR843 2SA1029D
C874 100P
D853
R857 330
R843 33K
R874 220
TR851 2SC2610
(C840)
CV840 ~40P
+8V
R844 33K
R840 470
R873 220
TR852 2SC2610
C873 100P
TR844 2SA1029D
R881 220
D854 1SS133
R858 330
R871 100
X⁻
TO CRT 7
100V ±92V
10.2V/div
10.2V/100μs
0V
50 V/div
2m S/div
R872 100
X⁺
TO CRT 7
C848 22P
R846 100K 1W
C846 2PC/500V
D852 1SS133
L852 6.8mH
R856 22k 1/2W
R854 22K 1/2W
TR854 2SC2610
R852 22K 1/2W
+7.37V
+8V
R864 470
R865 470
R869 10
+5V
14
IC 801
7
C861 0.01
FROM IC571 4
5

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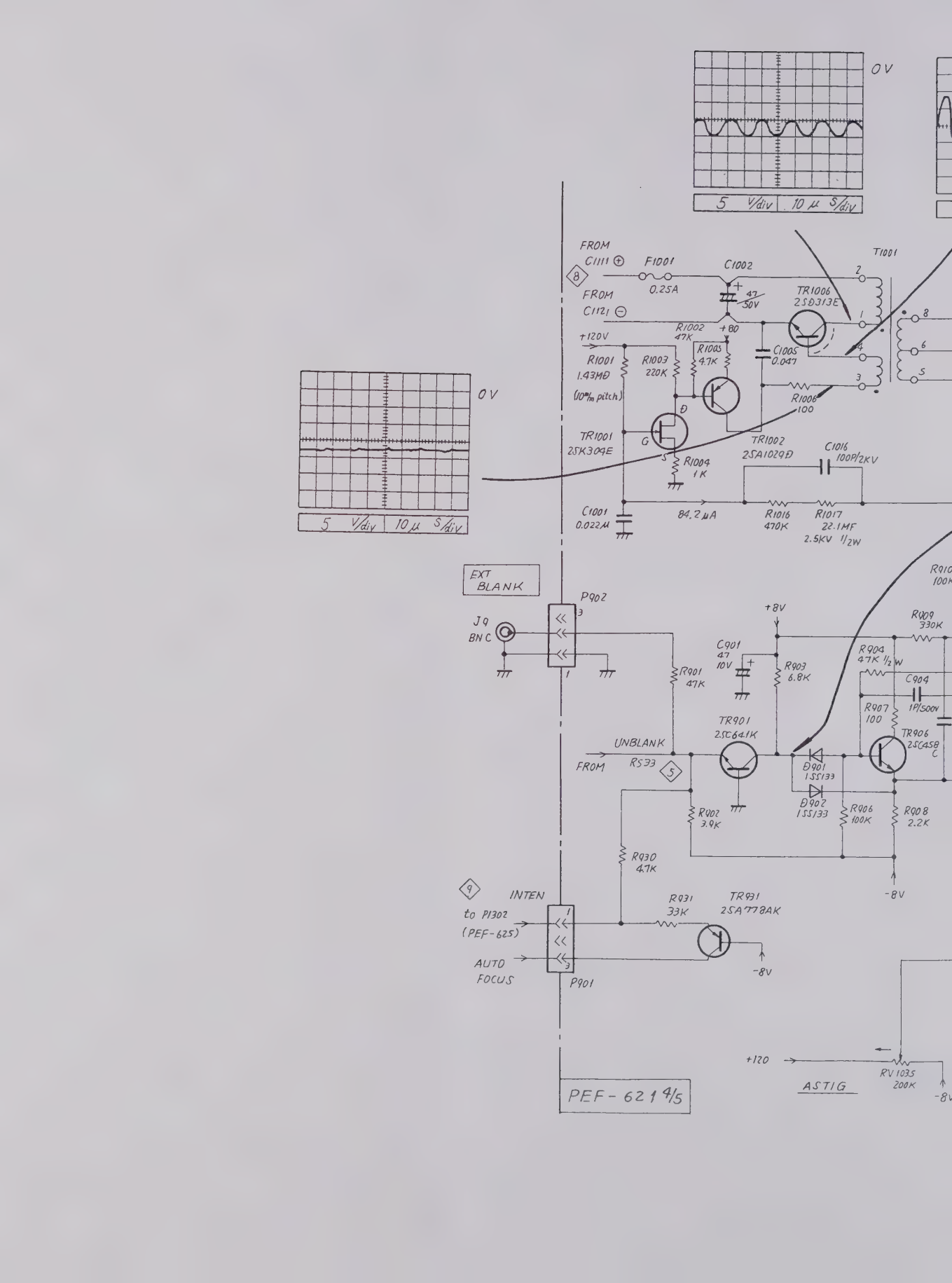
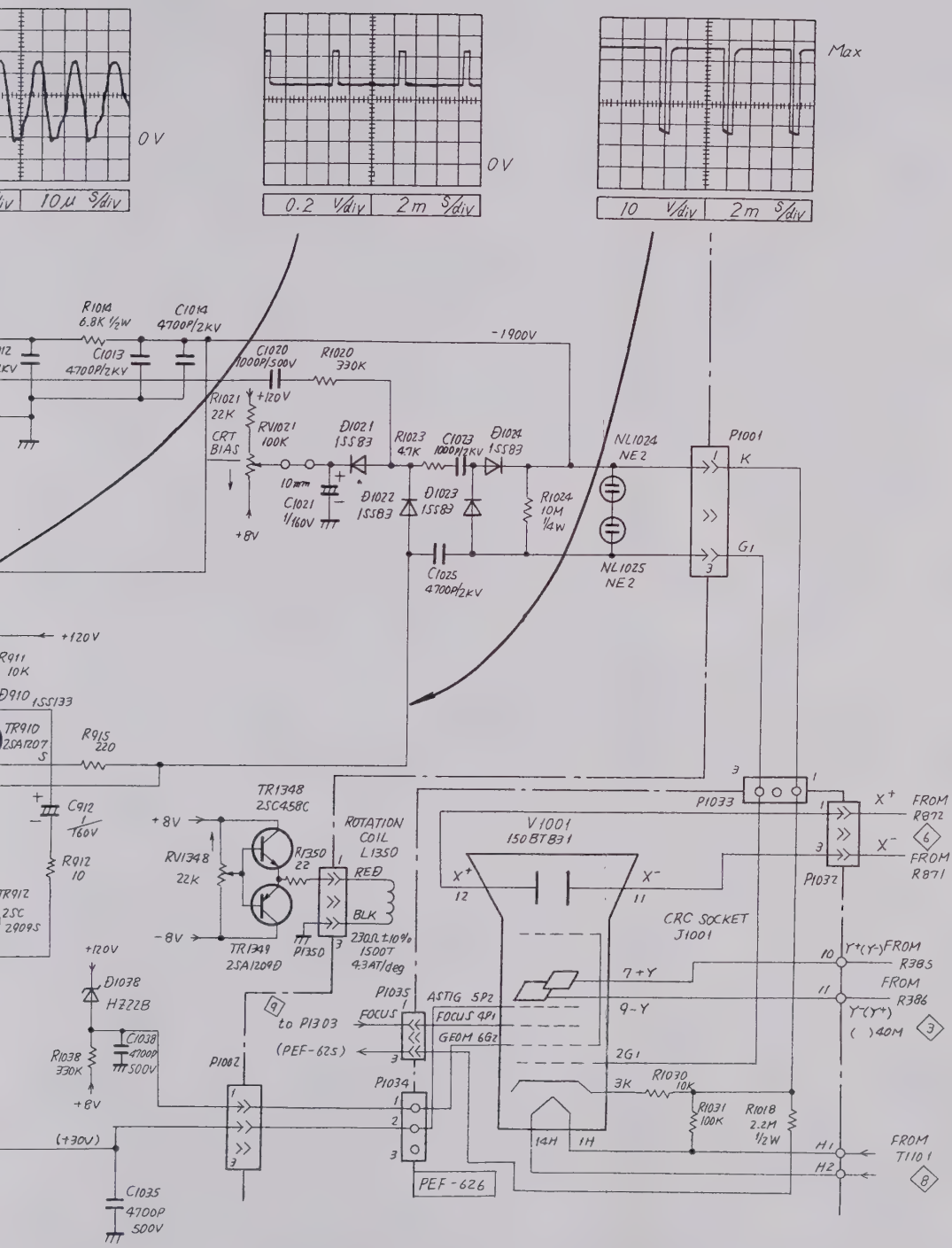
H AMP ⑥


0V
5 V/div
10 μ S/div
FROM C1111 ⊕
F1001
0.25A
C1002
47 50V
FROM C1121 ⊖
T1001
TR1006 2SB313E
+120V
R1001 1.43MΩ (10% tm pitch)
R1002 47K
+80
R1003 220K
R1005 4.7K
C1005 0.047
R1006 100
TR1001 2SK304E
TR1002 2SA1029Ð
C1016 100P/2KV
R1004 1K
C1001 0.022μ
84.2 μA
R1016 470K
R1017 22.1MF 2.5KV 1/2W
EXT BLANK
P902
J9 BNC
R901 47K
+8V
C901 47 10V
R903 6.8K
R909 330K
R904 47K 1/2W
C904
R907 100
TR901 2SC641K
TR906 2SC458C
UNBLANK FROM RS33
Ð901 1SS133
Ð907 1SS133
R902 3.9K
R906 100K
R908 2.2K
R930 4.7K
-8V
INTEN to P1302 (PEF-625)
AUTO FOCUS
P901
R931 33K
TR931 2SA778AK
+120
RV1035 200K
ASTIG
PEF-6214/5



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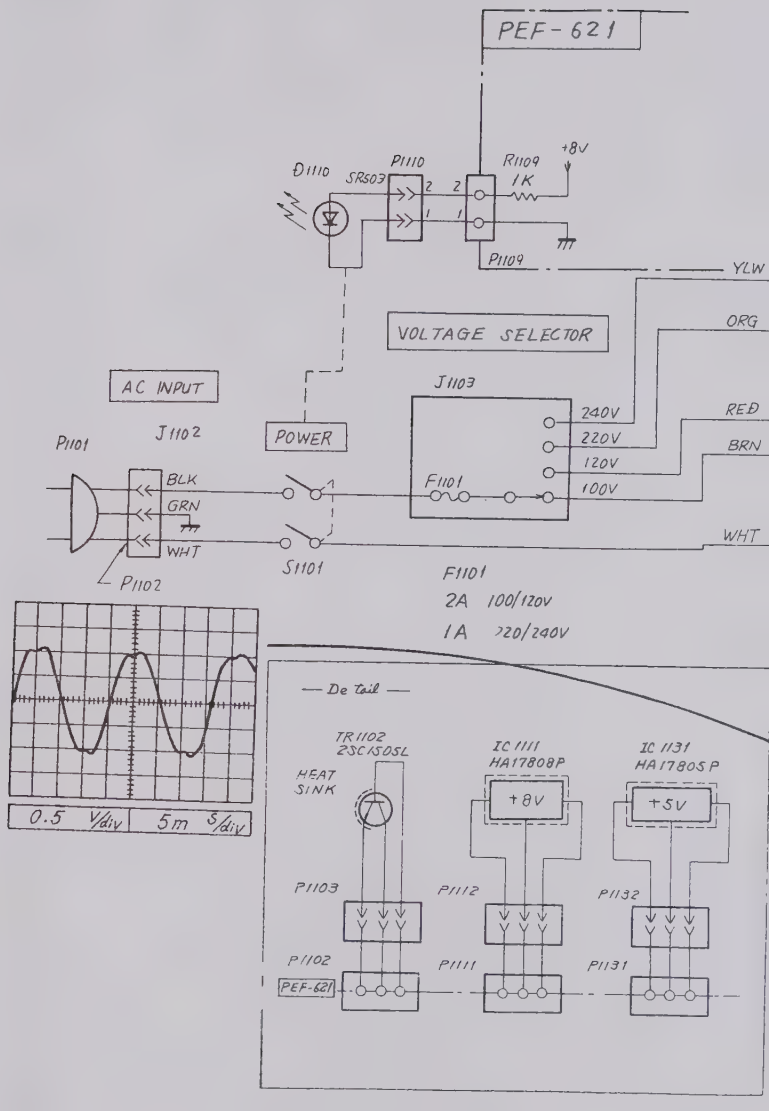
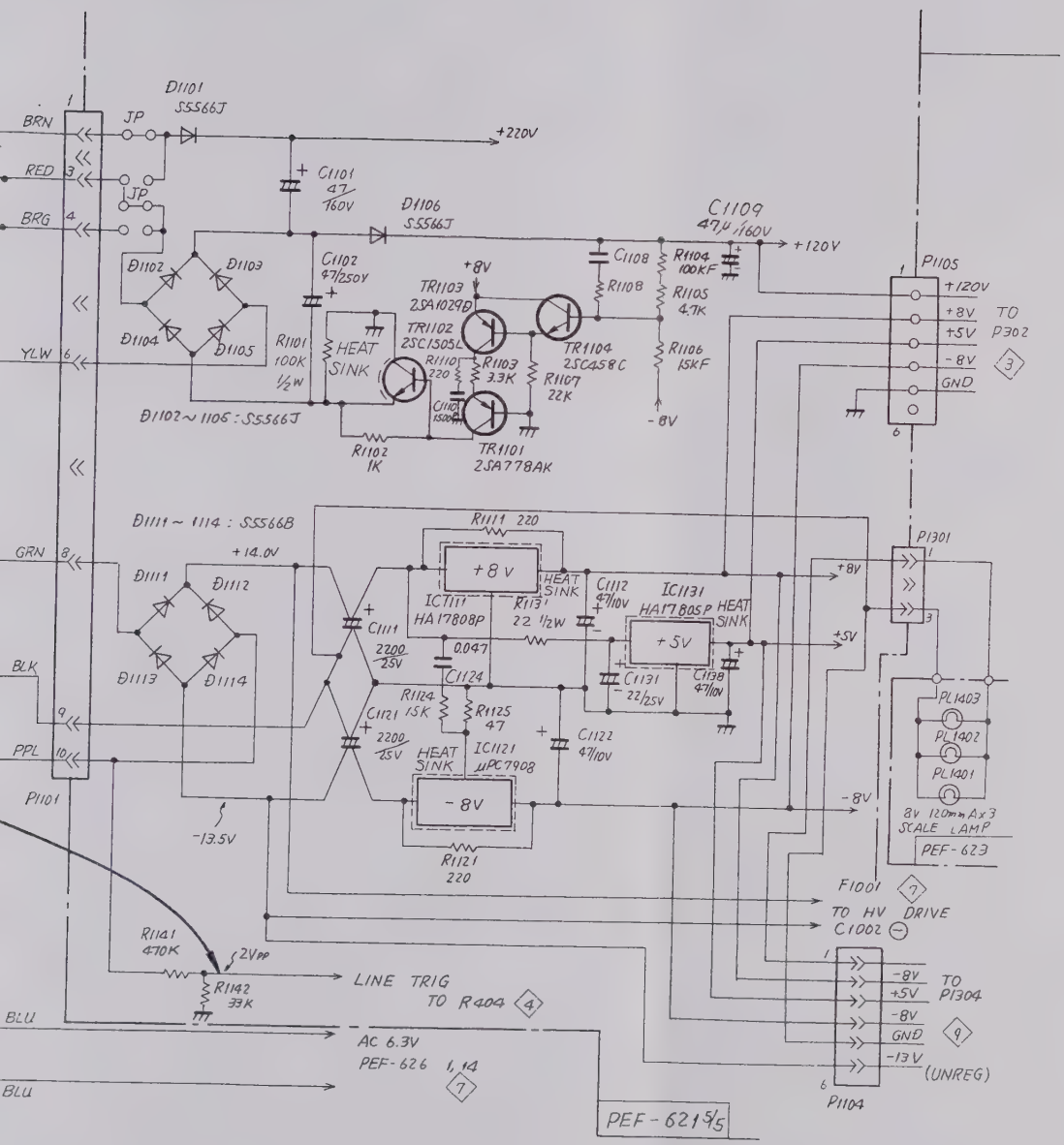
HV & Z AMP ⑦


PEF-621
D1110
SR503
P1110
R1109
1K
+8V
P1109
YLW
ORG
VOLTAGE SELECTOR
AC INPUT
J1103
240V
220V
120V
100V
RED
BRN
WHT
P1101
J1102
POWER
BLK
GRN
WHT
F1101
S1101
P1102
F1101
2A 100/120V
1A 220/240V
0.5 V/div
5m S/div
— De tail —
TR1102
2SC1505L
HEAT SINK
IC 1111
HA17808P
+8V
IC 1131
HA17805P
+5V
P1103
P1112
P1132
P1102
P1111
P1131
PEF-621



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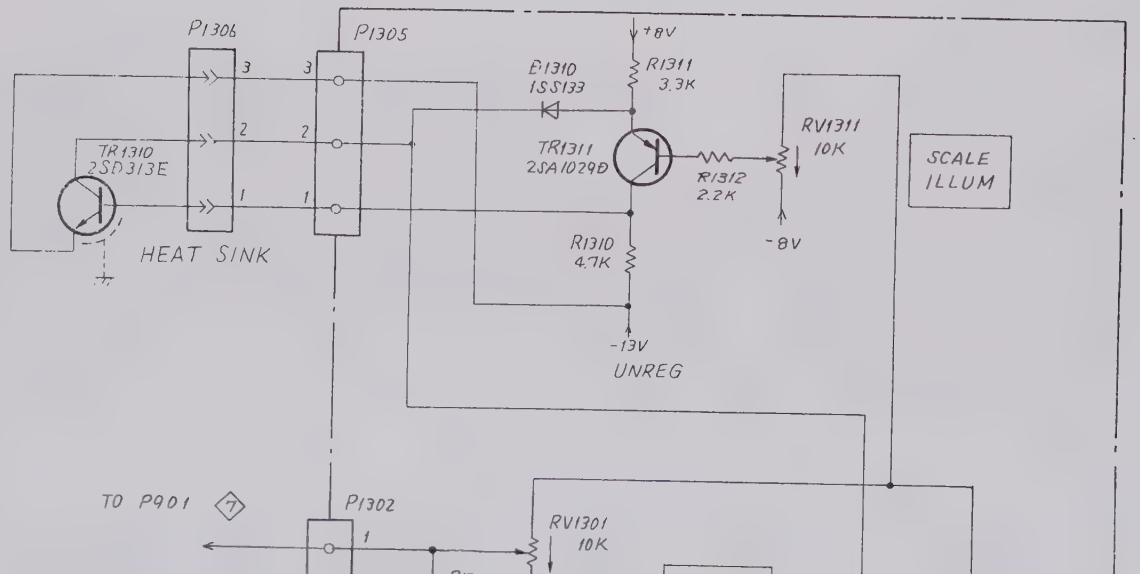
POWER SUPPLY ⑧


P1306
P1305
3
3
2
2
1
1
TR1310
2SD313E
HEAT SINK
+8V
D1310
1SS133
R1311
3.3K
TR1311
2SA1029D
R1312
2.2K
RV1311
10K
SCALE
ILLUM
-8V
R1310
4.7K
-13V
UNREG
TO P901
7
P1302
1
RV1301
10K

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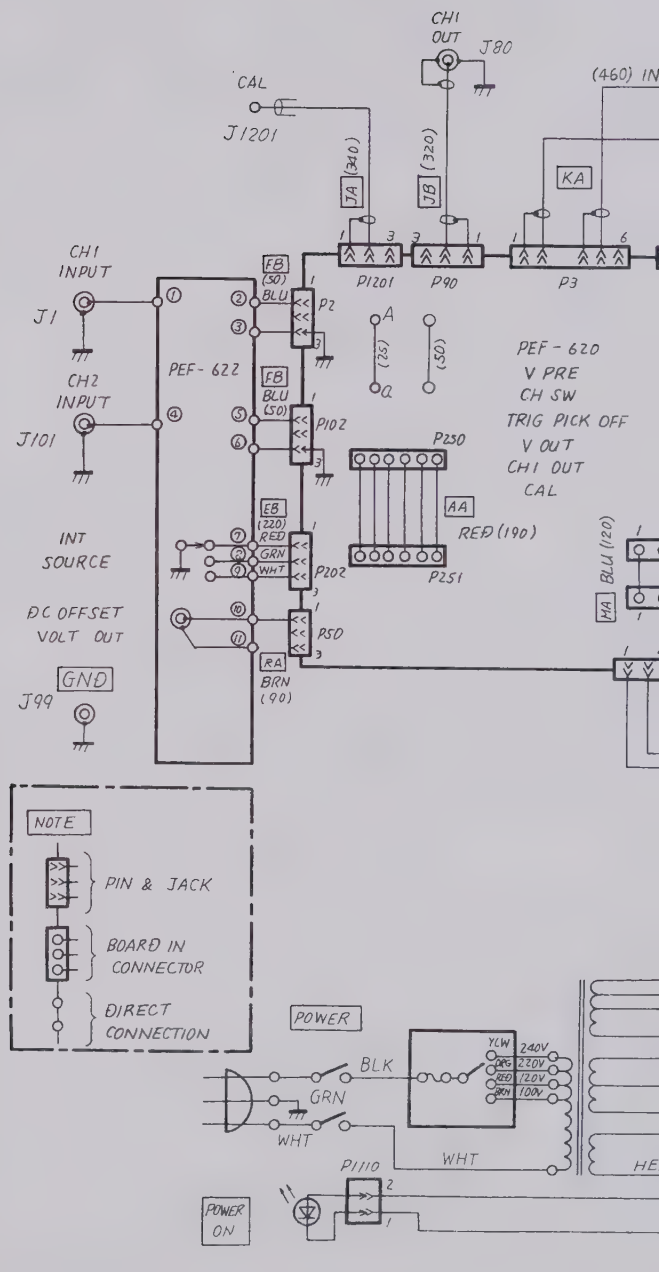
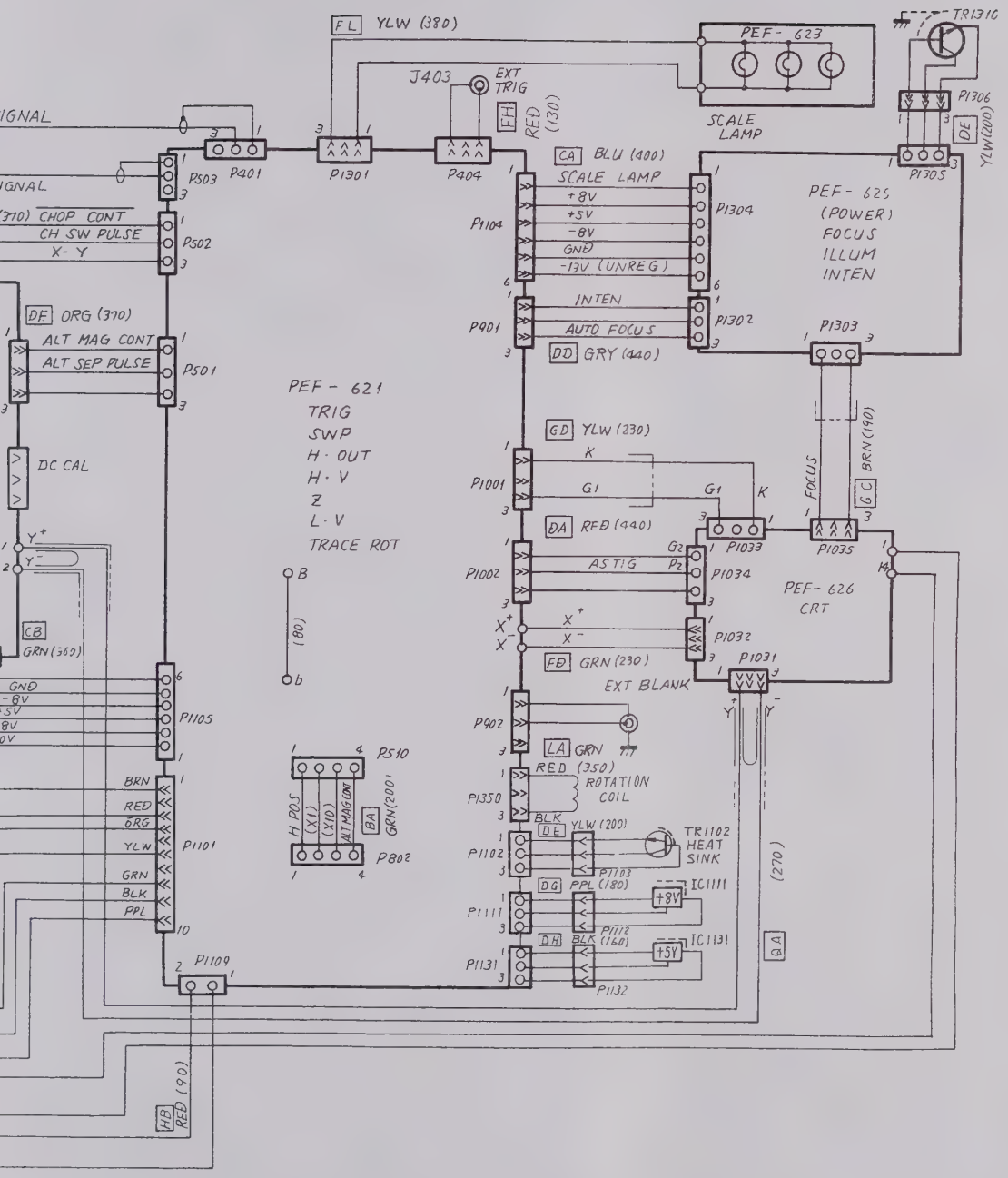
RV/LAMP 9


CH1 OUT
J80
CAL
J1201
(460) IN
JA (340)
JB (320)
KA
CH1 INPUT
J1
CH2 INPUT
J101
FB (50) BLU
P2
P102
PEF-622
P1201
P90
P3
A
(25)
(50)
PEF-620
V PRE
CH SW
TRIG PICK OFF
V OUT
CH1 OUT
CAL
P250
P251
AA
RED (190)
FB (220) RED
GRN
WHT
P202
INT SOURCE
DC OFFSET VOLT OUT
P50
RA BRN (90)
GND
J99
BLU (120)
AA
NOTE
PIN & JACK
BOARD IN CONNECTOR
DIRECT CONNECTION
POWER
BLK
GRN
WHT
YLW
RED
BRN
240V
220V
120V
100V
P1110
WHT
POWER ON



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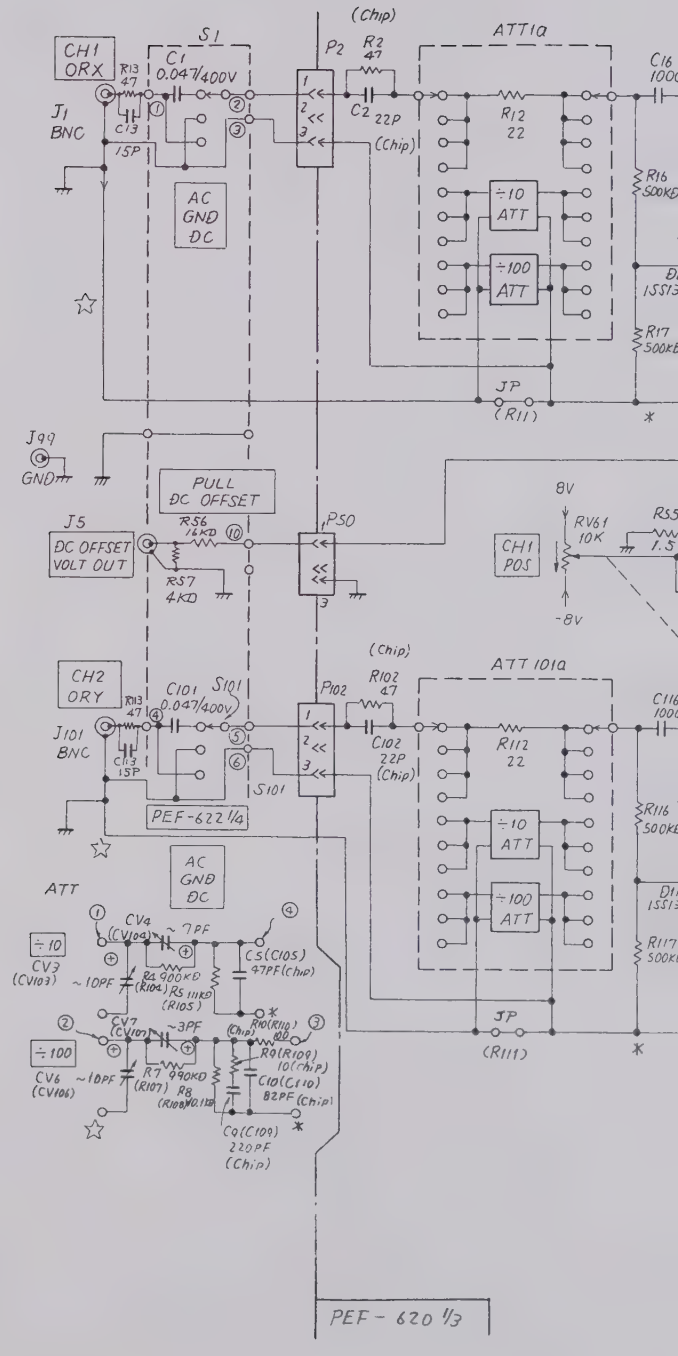
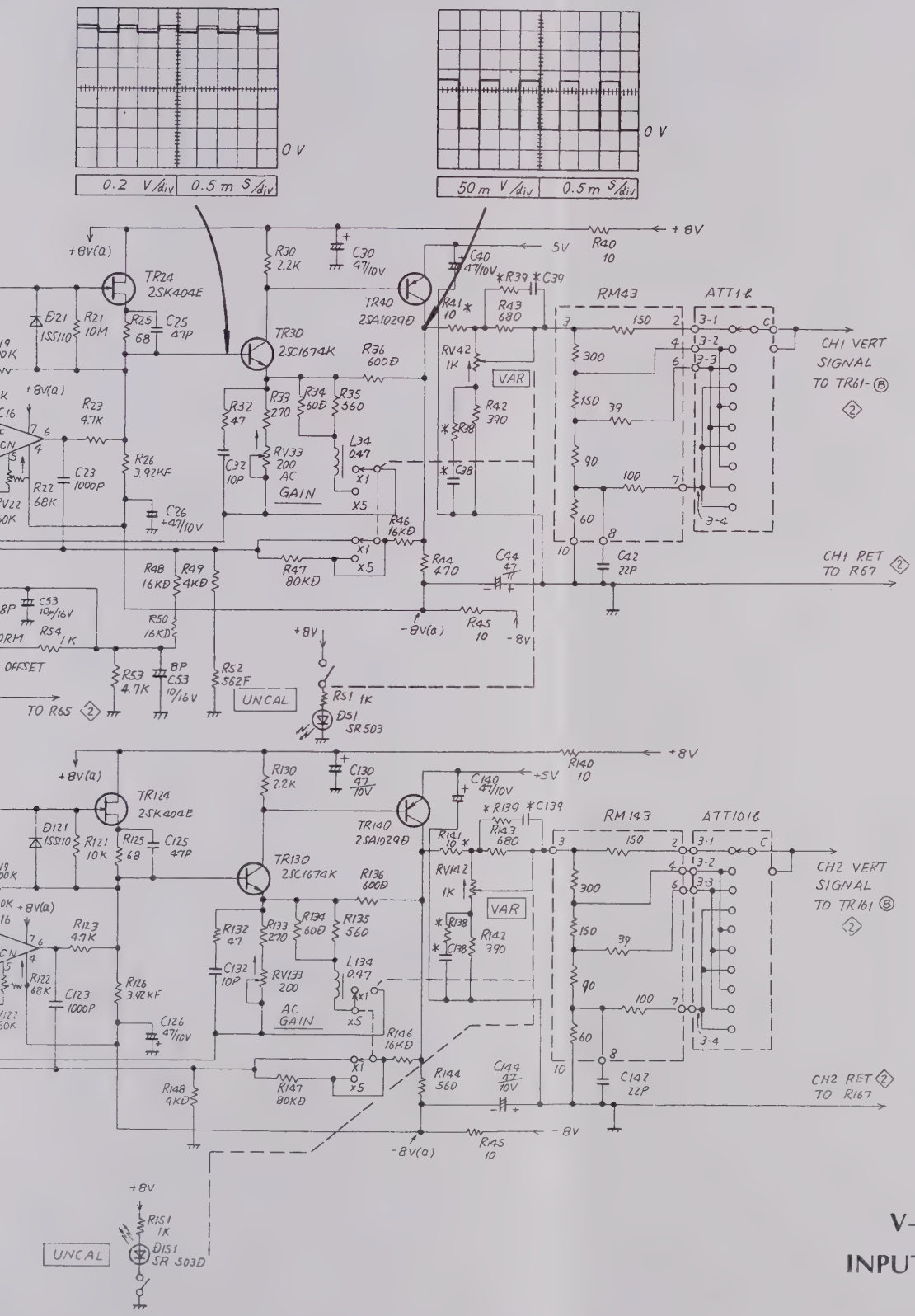
WIRING DIAGRAM


CH1 ORX
J1 BNC
R13 47
C13 15P
S1
C1 0.047/400V
AC GND DC
P2
R2 47
C2 22P (Chip)
ATT1a
R12 22
÷10 ATT
÷100 ATT
C16 100
R16 500KΩ
R17 500kΩ
JP (R111)
J99 GND
PULL DC OFFSET
J5 DC OFFSET VOLT OUT
R56 14KΩ
R57 4KΩ
P50
8V
RV61 10K
-8V
CH1 POS
CH2 ORY
J101 BNC
C101 0.047/400V
S101
C103 15P
P102
R102 47
C102 22P (Chip)
ATT 101a
R112 22
R116 500KΩ
R117 500KΩ
JP (R111)
PEF-622 1/4
AC GND DC
ATT
÷10
CV3 (CV103)
~10PF
CV4 (CV104)
~7PF
R4 900KΩ (R104)
R5 111KΩ (R105)
C5 (C105) 47PF (Chip)
÷100
CV6 (CV106)
~10PF
CV7 (CV107)
~3PF
R7 990KΩ (R107)
R8 (R108) 90.1Ω
R10 (R110) (Chip)
R9 (R109) 10Ω (Chip)
C10 (C110) 82PF (Chip)
C9 (C109) 220PF (Chip)
PEF-620 1/3



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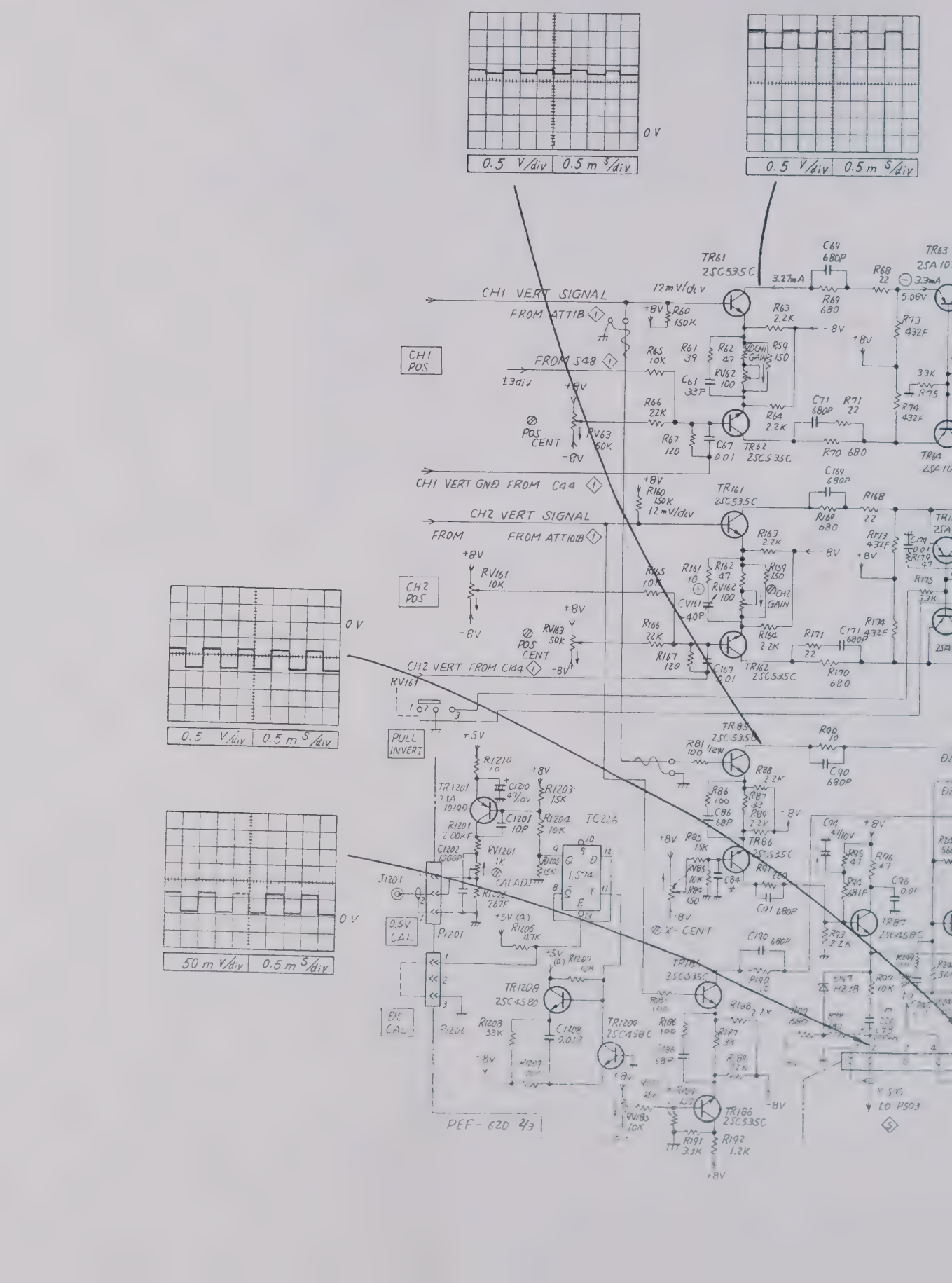
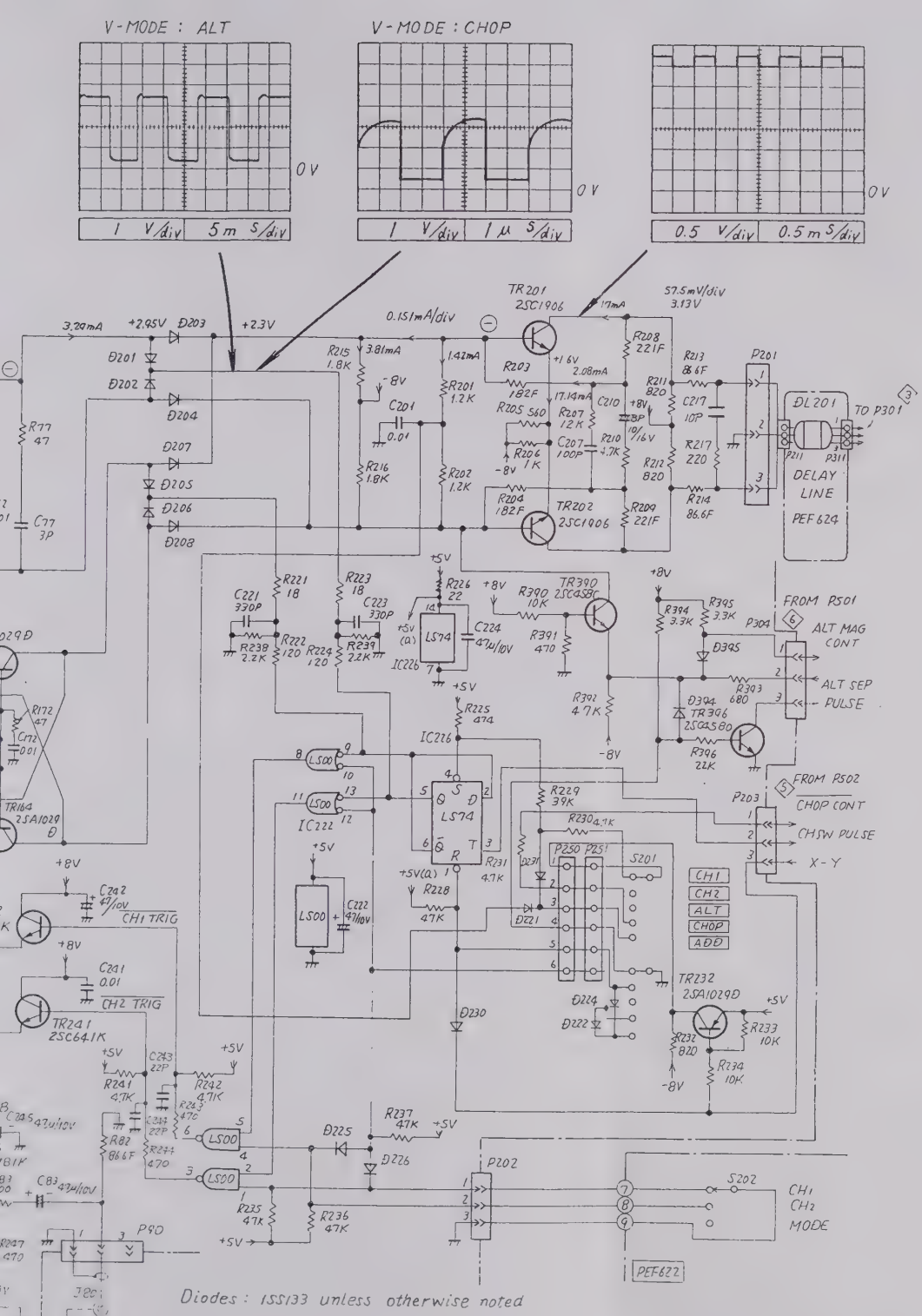
INPUT AMP ①


0 V
0.5 V/div
0.5 m S/div
0 V
0.5 V/div
0.5 m S/div
0 V
0.5 V/div
0.5 m S/div
0 V
50 m V/div
0.5 m S/div
CH1 VERT SIGNAL
FROM ATT1B
CH1 POS
FROM S48
±3div
POS CENT
CH1 VERT GND FROM C44
CH2 VERT SIGNAL
FROM ATT101B
CH2 POS
POS CENT
CH2 VERT FROM C44
RV161
PULL INVERT
0.5V CAL
DC CAL
CALADJ
X-CENT
Y-SIG
TO PSD3
PEF-620 2/3
TR61 2SC535C
TR62 2SC535C
TR63 2SA10
TR64 2SA10
TR161 2SC535C
TR162 2SC535C
TR163 2SA10
TR164 2SA10
TR185 2SC535C
TR186 2SC535C
TR1201 2SA1015
TR1202 2SC458C
TR1203 2SC458C
TR1204 2SC458C
TR1205 2SC458C
TR1206 2SC458C
TR1207 2SC458C
TR1208 2SC458C
TR1209 2SC458C
IC226 LS74
12mV/div
3.27mA
3.3mA
5.08V
+8V
-8V
+5V
0V



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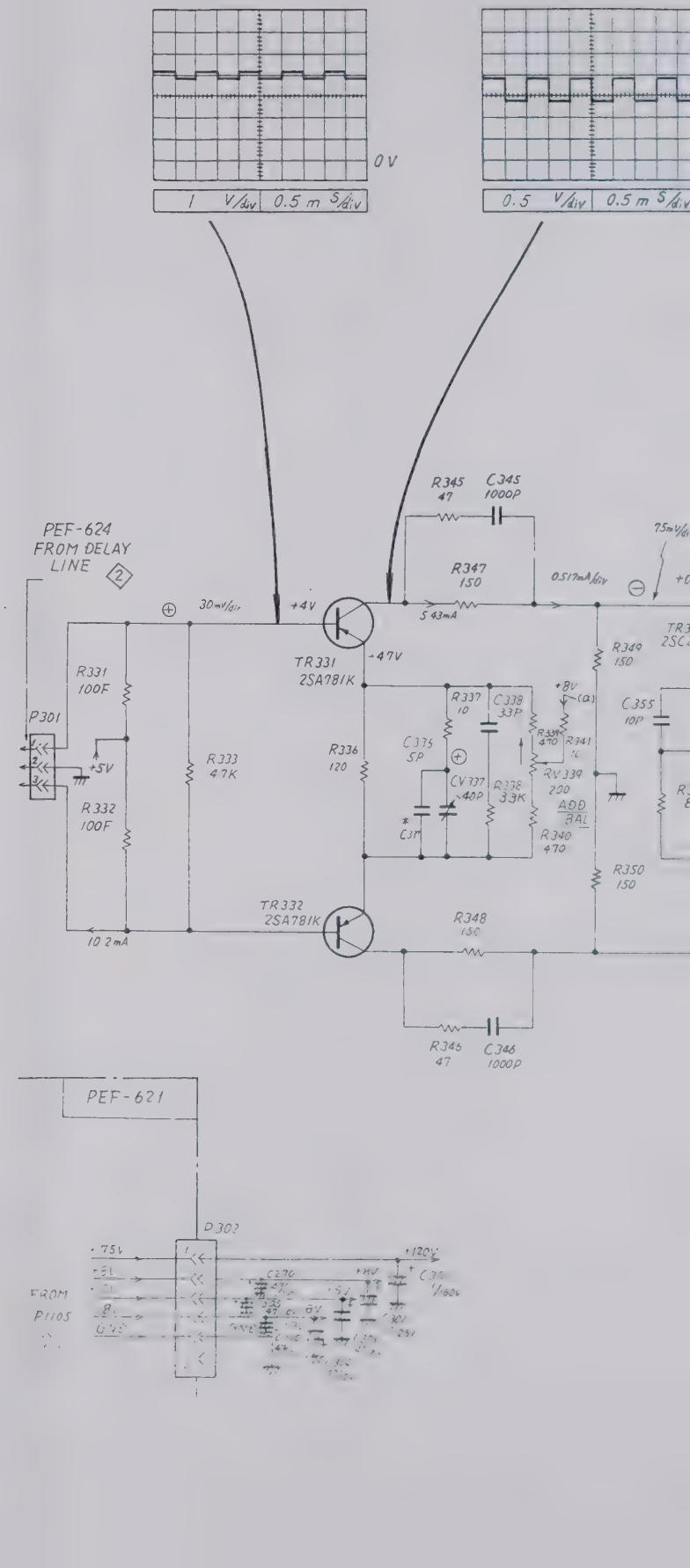
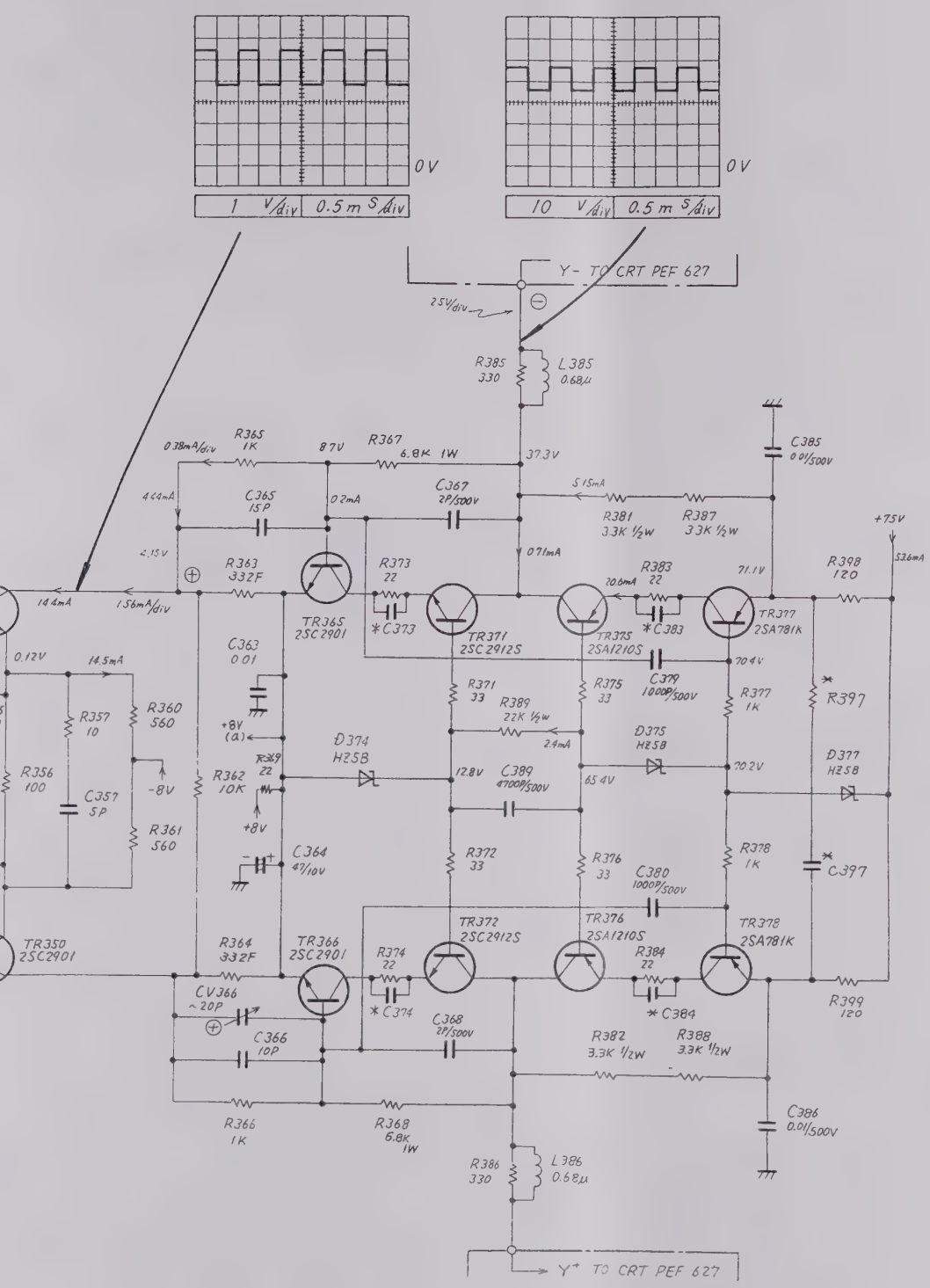
VERT PREAMP TRIG PICKOFF & CH SW MULTI ②


0V
1 V/div 0.5 m S/div
0.5 V/div 0.5 m S/div
PEF-624
FROM DELAY
LINE
2
30mV/div
+4V
5.43mA
R345
47
C345
1000P
R347
150
0.517mA/div
75mV/div
TR331
2SA781K
+4.7V
R331
100F
R332
100F
P301
+5V
R333
4.7K
R336
120
R337
10
C338
33P
C335
5P
CV337
40P
R338
3.3K
+8V
(a)
R339
470
R341
1K
RV339
200
ADD
BAL
R340
470
C337
R349
150
C355
10P
R350
150
TR332
2SA781K
10.2mA
R348
150
R345
47
C346
1000P
PEF-621
D302
+75V
+8V
+120V
C370
1/160V
FROM
P1105
8V
6V



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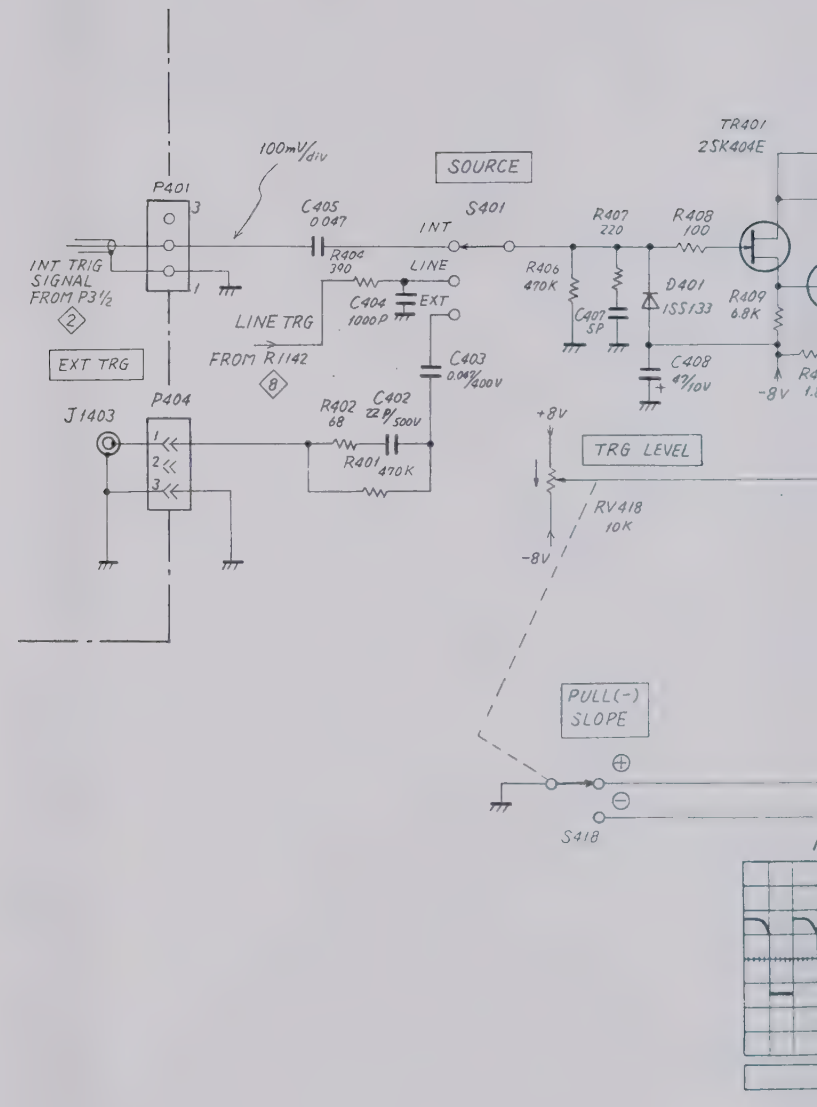
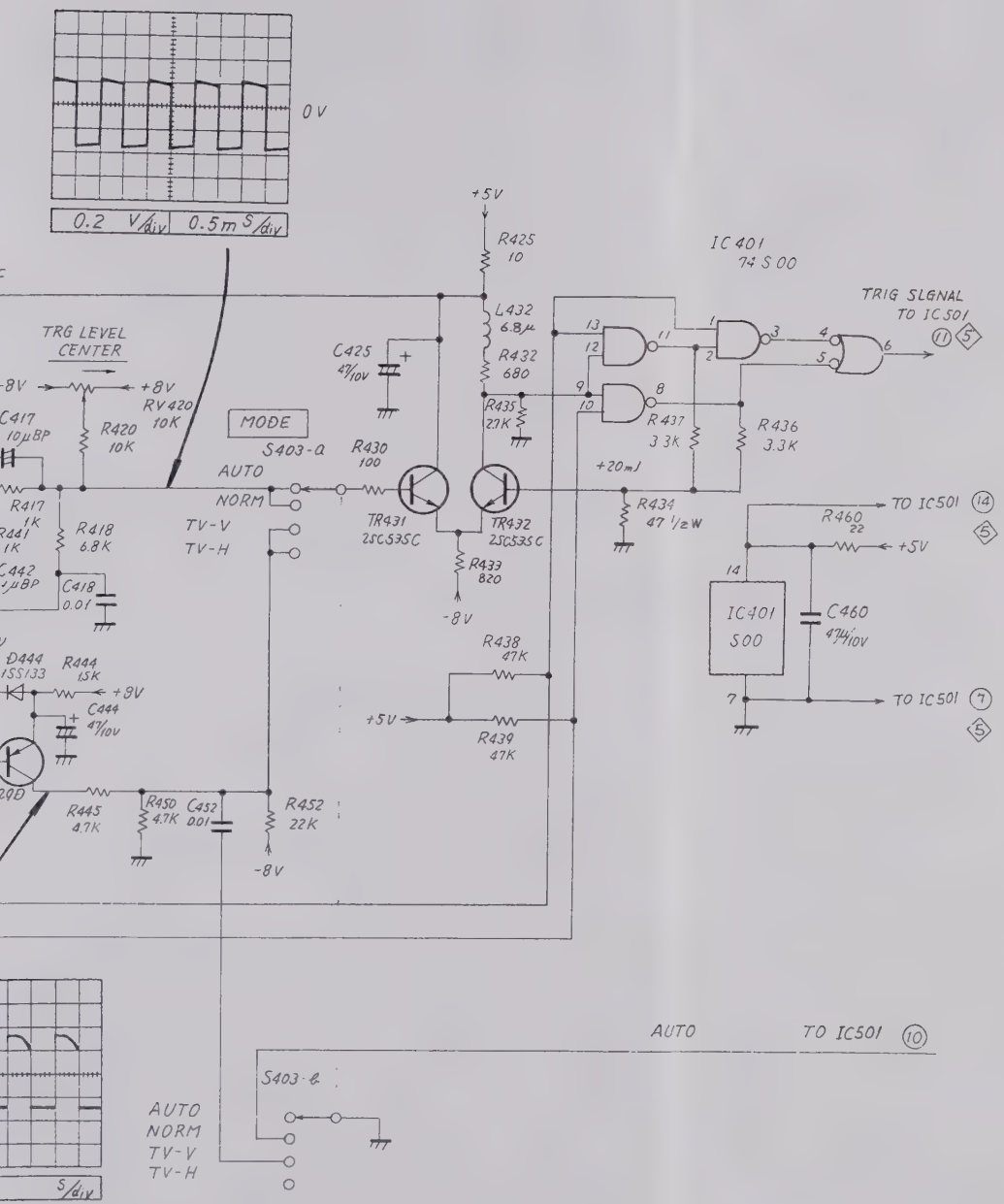
V OUT AMP ③


TR401
2SK404E
100mV/div
SOURCE
P401
3
C405
0.047
S401
INT
R407
220
R408
100
INT TRIG
SIGNAL
FROM P3½
2
1
R404
390
LINE
R406
470K
C404
1000P
EXT
LINE TRG
FROM R1142
8
C407
SP
D401
1SS133
R409
6.8K
EXT TRG
C403
0.047/400V
C408
47/10V
-8V
P404
J1403
R402
68
C402
22P/500V
1
2
3
R401
470K
+8V
TRG LEVEL
RV418
10K
-8V
PULL(-)
SLOPE
S418



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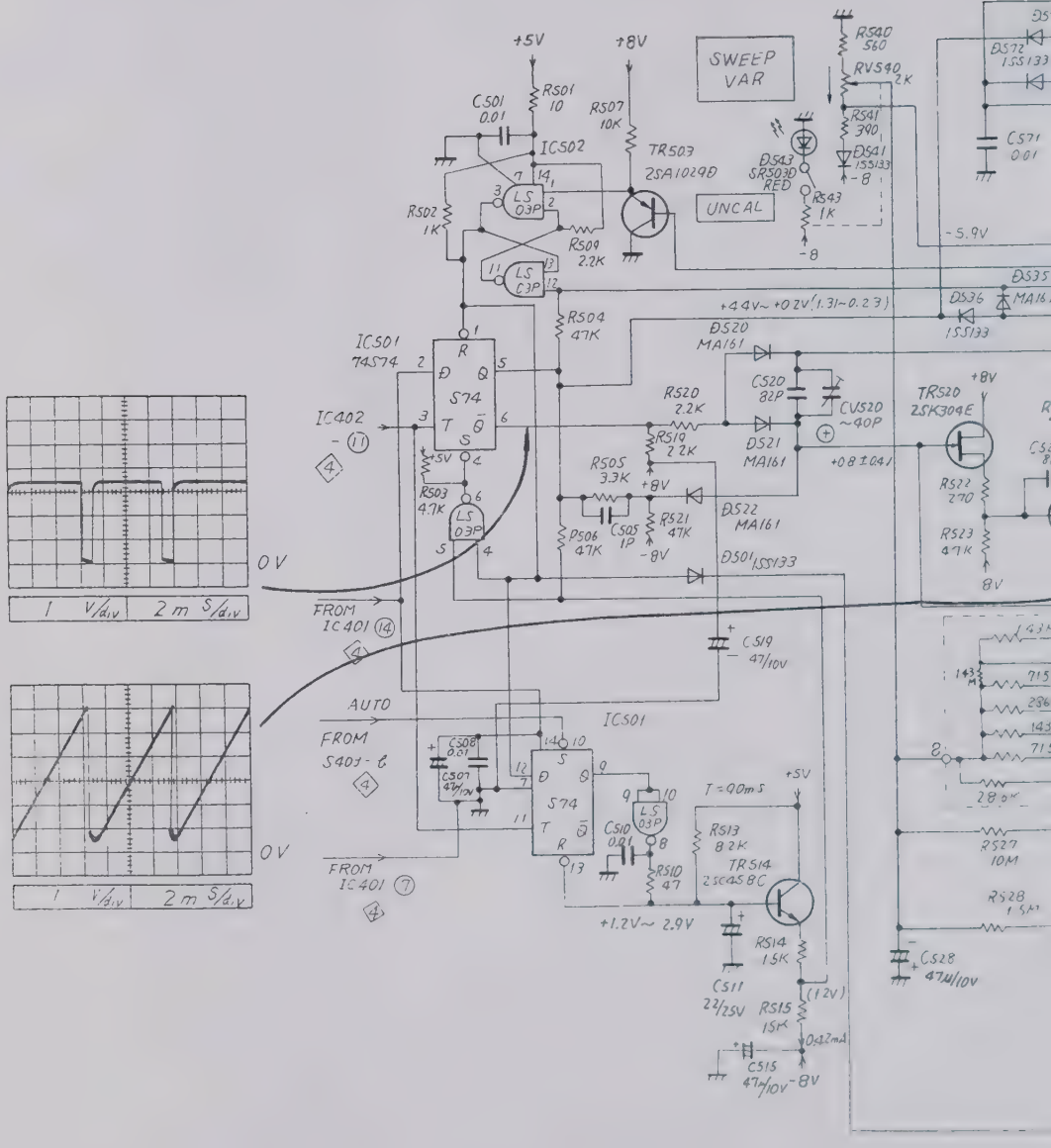
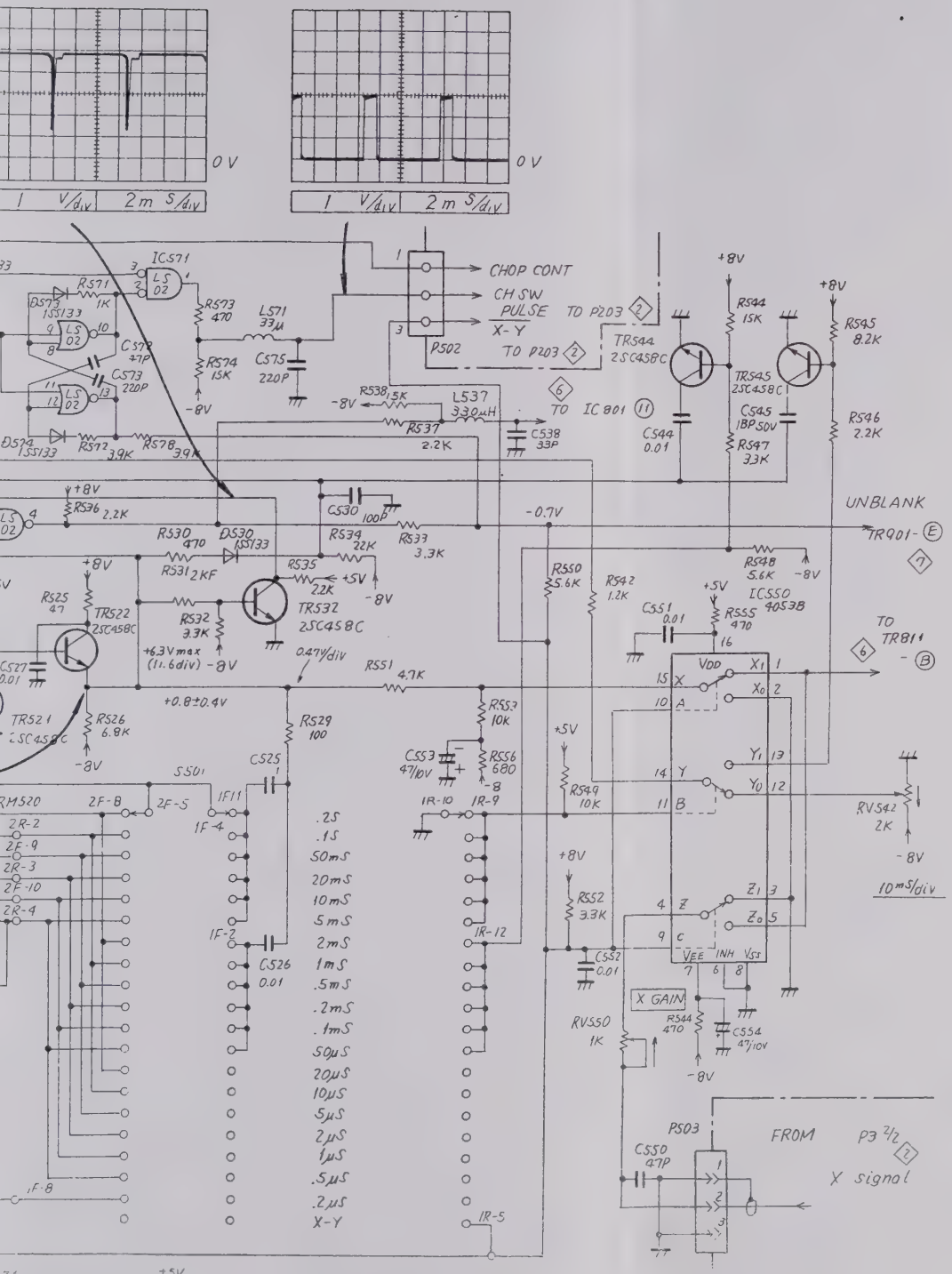
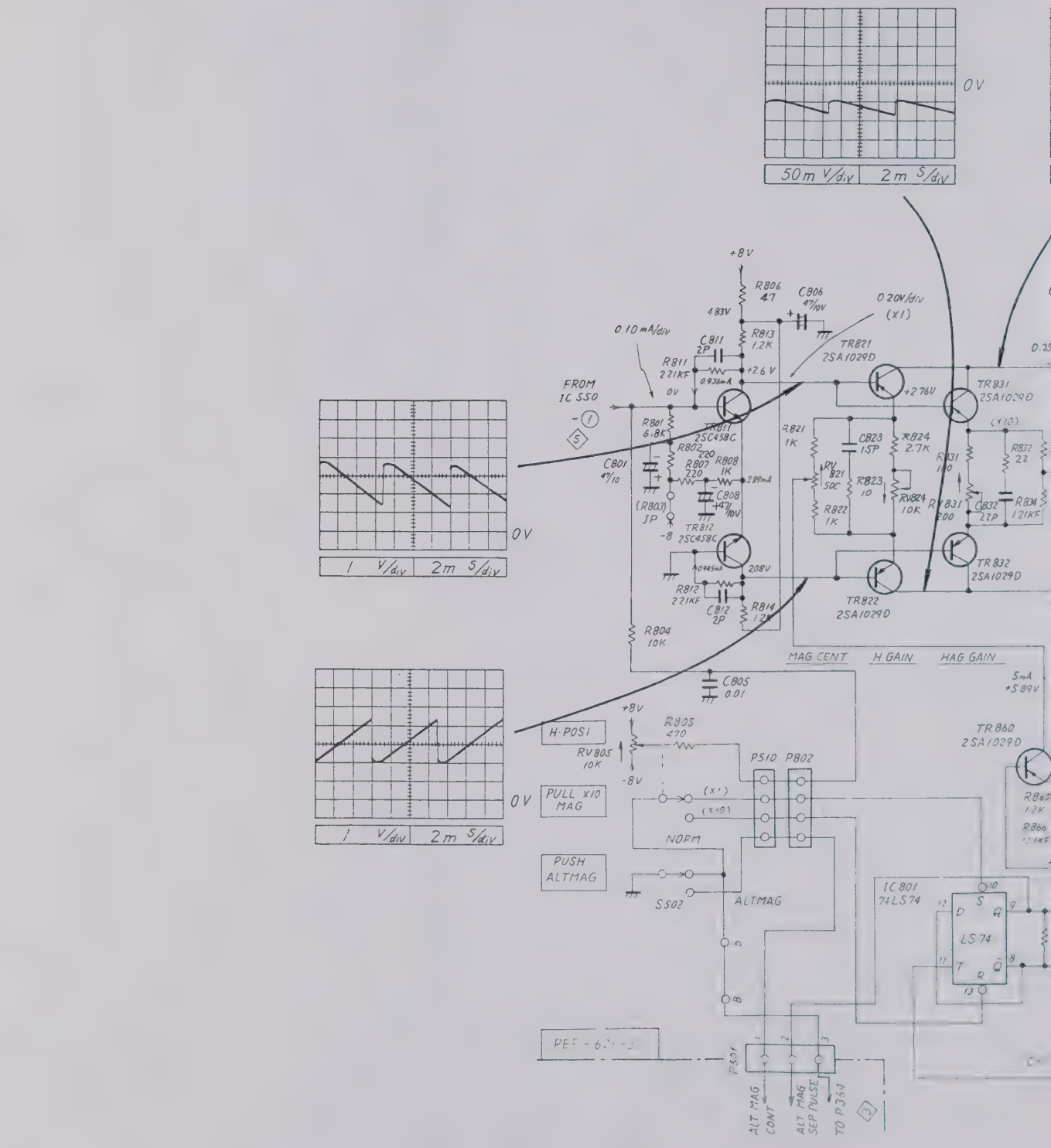
TRIG GEN ◇4

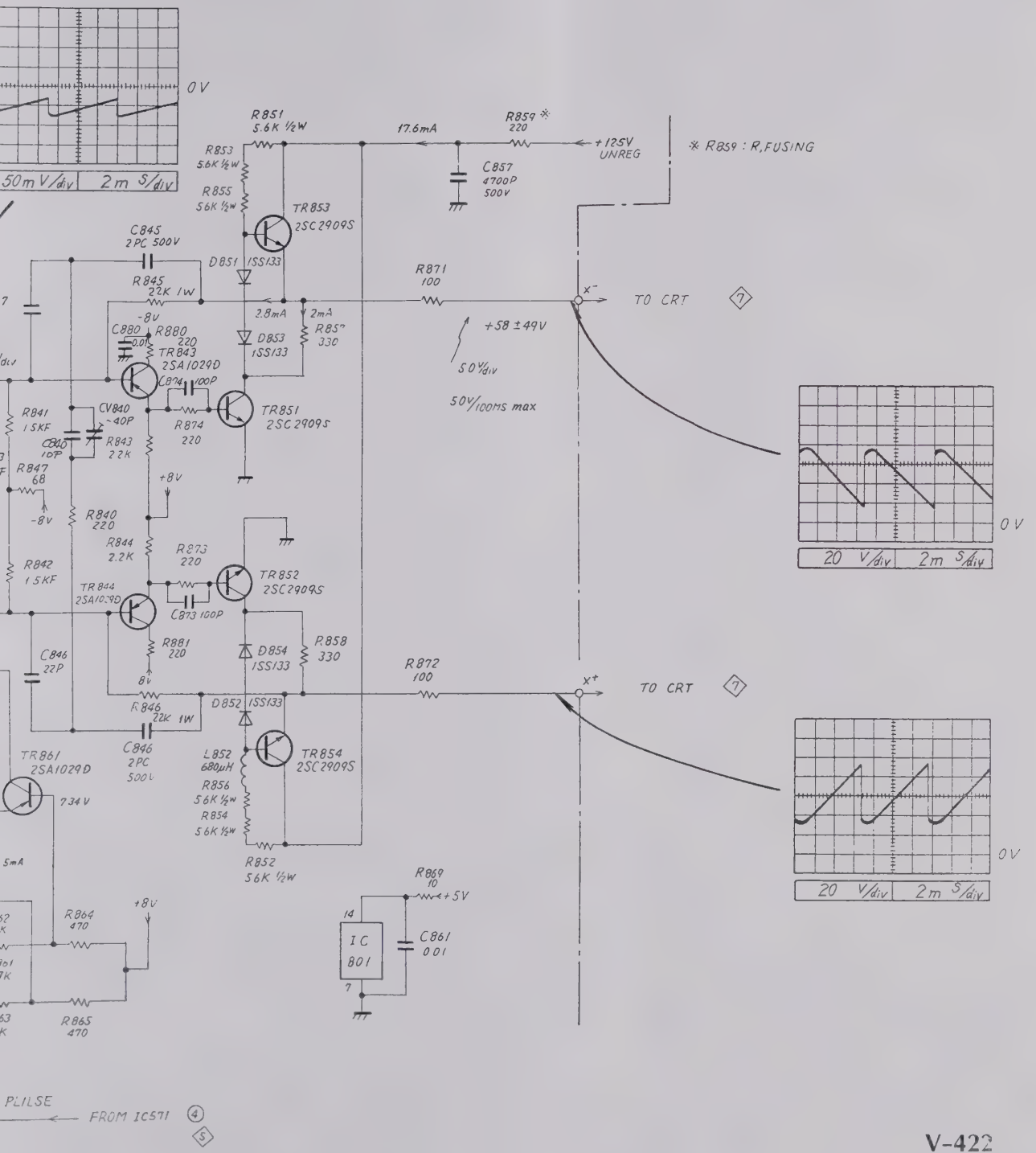

+5V
+8V
SWEEP VAR
RS40 560
RVS40 2K
RS41 390
DS41 1SS133
DS43 SR503D RED
RS43 1K
UNCAL
-8
-5.9V
C501 0.01
RS01 10
RS07 10K
IC502
TR503 2SA1029D
RS02 1K
LS 03P
RS09 2.2K
+44V~+02V (1.31~0.23)
DS35
DS36
MA161
1SS133
RS04 47K
IC501 74S74
DS20 MA161
CS20 82P
CVS20 ~40P
RS20 2.2K
RS19 2.2K
DS21 MA161
+0.8±0.4V
TRS20 2SK304E
RS22 270
RS23 47K
IC402
RS03 4.7K
RS05 3.3K
RS21 47K
CS05 1P
DS22 MA161
RS06 47K
DS01 1SS133
FROM IC401 (14)
CS19 47/10V
AUTO
FROM S401-6
IC501
CS08 0.01
CS07 47/10V
CS10 0.01
RS10 47
T=90mS
RS13 82K
TR514 2SC458C
RS14 1.5K
RS15 1.5K
(12V)
0.42mA
CS11 22/25V
CS15 47/10V
-8V
+1.2V~2.9V
RS27 10M
RS28 1.5M
CS28 47M/10V
1 V/div
2m S/div
0V



*: Factory adjusted value.

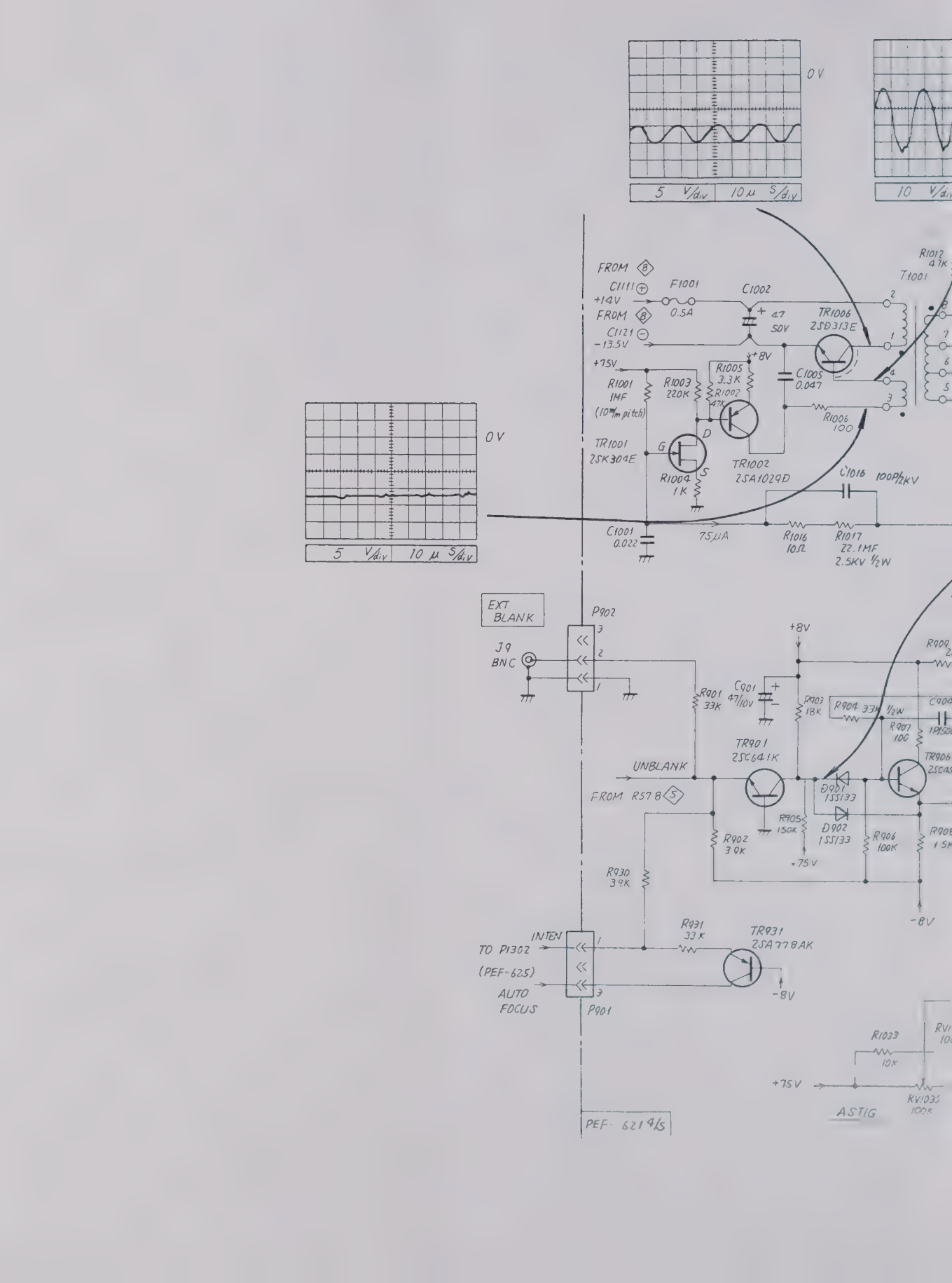
V-422
SWEEP GEN ⑤

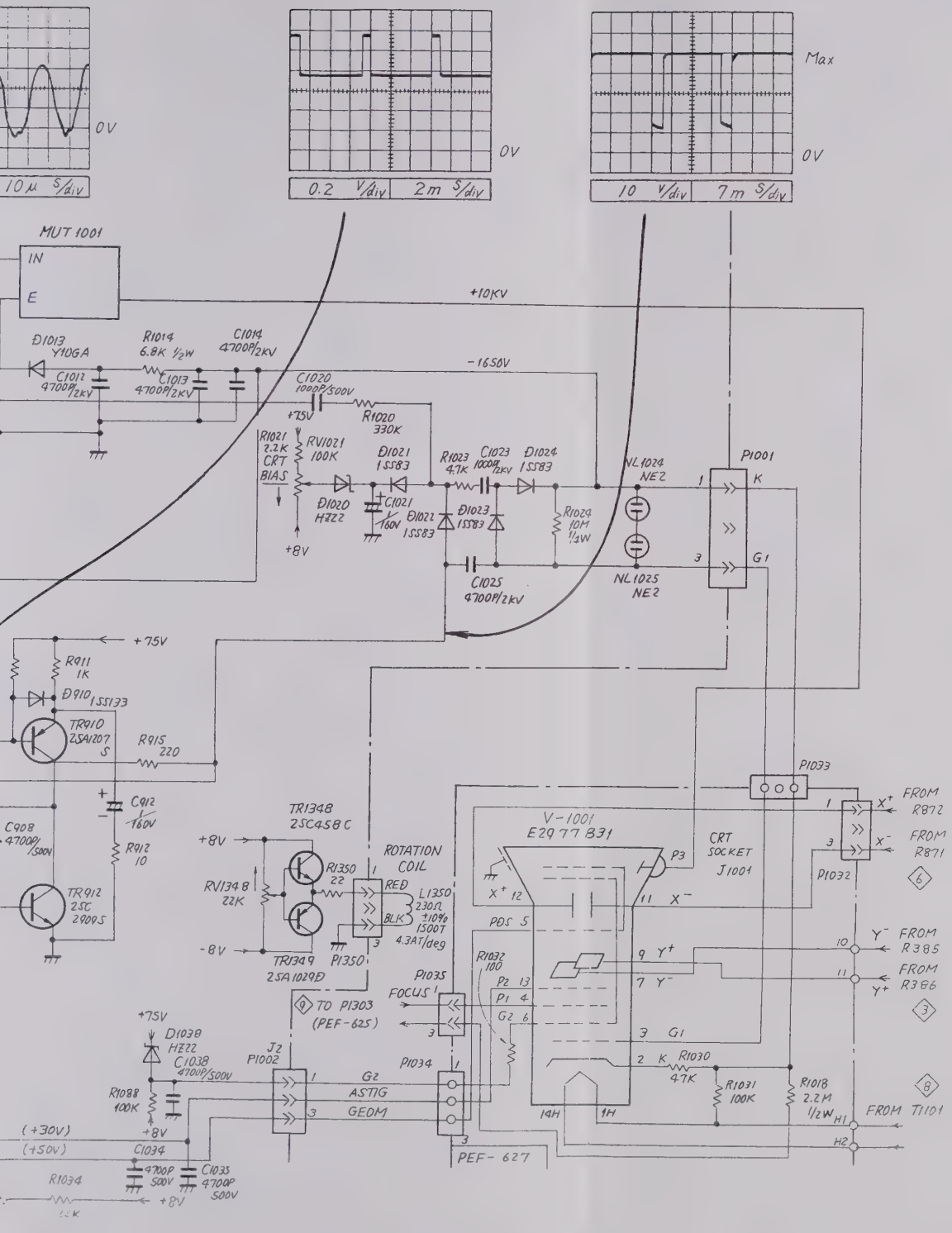

0V
50m V/div
2m S/div
+8V
R806 47
C806 47/10V
4.83V
0.10mA/div
R813 1.2K
C811 2P
R811 221KF
0.936mA
+2.6V
0V
FROM IC 550
0.20V/div (x1)
TR821 2SA1029D
TR831 2SA1029D
+2.76V
TR811 2SC458C
R801 6.8K
R802 220
R807 220
R808 1K
C801 47/10
(R803) JP
-8
C808 47/10V
2.89mA
TR812 2SC458C
0.945mA
2.08V
R812 221KF
C812 2P
R814 12K
R804 10K
R821 1K
C823 15P
R824 2.7K
RV821 50C
R823 10
RV824 10K
R922 1K
R831 100
R832 22
C832 22P
R834 121KF
TR832 2SA1029D
TR822 2SA1029D
MAG CENT
H GAIN
HAG GAIN
5mA
+5.89V
C805 0.01
1V/div
2m S/div
0V
+8V
H POSI
RV805 10K
R805 470
-8V
PULL X10 MAG
(x1)
(x10)
NORM
PUSH ALTMAG
S502
ALTMAG
PS10
P802
TR860 2SA1029D
IC801 74LS74
LS 74
ALT MAG CONT
ALT MAG SEP PULSE
TO P354


0V
50mV/div
2m S/div
R851 5.6K ½W
17.6mA
R859 ※ 220
+12.5V UNREG
※ R859 : R, FUSING
R853 5.6K ½W
R855 5.6K ½W
TR853 2SC2909S
C857 4700P 500V
C845 2PC 500V
D851 1SS133
R845 22K 1W
R871 100
TO CRT
7
-8V
2.8mA
2mA
C880 0.01
R880 220
D853 1SS133
R857 330
+58 ± 49V
50V/div
50V/100ms max
TR843 2SA1029D
C874 100P
TR851 2SC2909S
R841 15KF
CV840 ~40P
C840 10P
R843 22K
R874 220
R847 68
+8V
-8V
R840 220
R844 2.2K
R873 220
TR852 2SC2909S
R842 15KF
TR844 2SA1029D
C873 100P
C846 22P
R881 220
D854 1SS133
R858 330
R872 100
x+
TO CRT
7
8V
R846 22K 1W
D852 1SS133
C846 2PC 500V
L852 680μH
TR854 2SC2909S
TR861 2SA1029D
7.34V
R856 5.6K ½W
R854 5.6K ½W
R852 5.6K ½W
5mA
R869 10
+5V
14
IC 801
7
C861 0.01
+8V
R864 470
R865 470
0V
20 V/div
2m S/div
0V
20 V/div
2m S/div
PULSE
FROM IC571
4
5

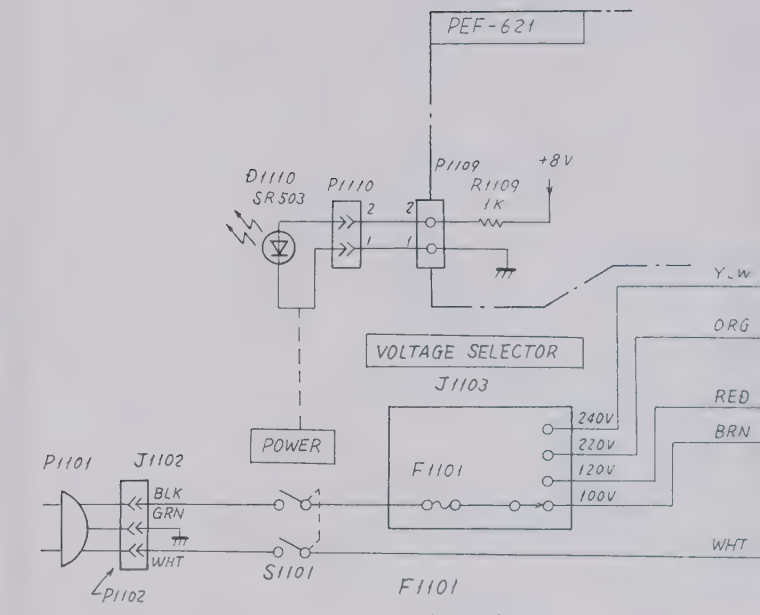
V-422

H AMP 6


0 V
5 V/div 10 μ S/div
FROM B
C1111 +14V
FROM B
C1121 −13.5V
F1001 0.5A
C1002 47 50V
TR1006 2SD313E
T1001
R1017 4.7K
+8V
+75V
R1001 1MF (10 m/m pitch)
R1003 220K
R1005 3.3K
R1002 47K
C1005 0.047
R1006 100
TR1001 2SK304E
G D S
TR1002 2SA1029D
R1004 1K
C1016 100PF/2KV
C1001 0.022
75μA
R1016 10Ω
R1017 22.1MF 2.5KV 1/2W
EXT BLANK
P902
J9 BNC
R901 33K
C901 47/10V
R903 18K
R904 33K 1/2W
R907 100
TR901 2SC641K
UNBLANK
FROM R578 S
D901 1SS133
D902 1SS133
R905 150K
R902 39K
R906 100K
R930 39K
INTEN
TO P1302
(PEF-625)
AUTO FOCUS
P901
R931 33K
TR931 2SA778AK
-8V
R1033 10K
RV1035 100K
ASTIG
PEF-621 4/5



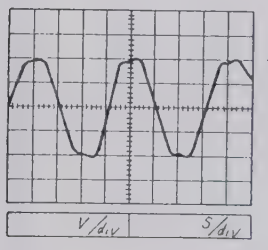
V-422
HV & Z AMP ⑦

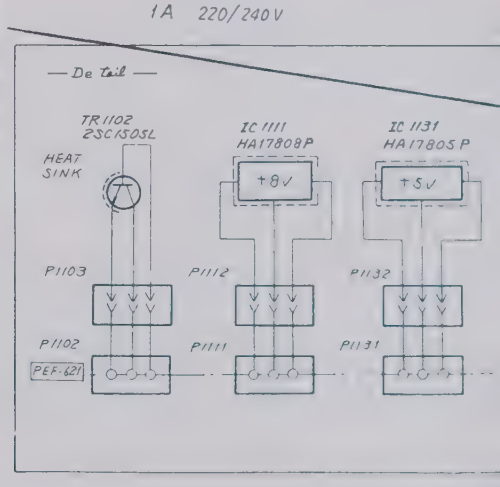


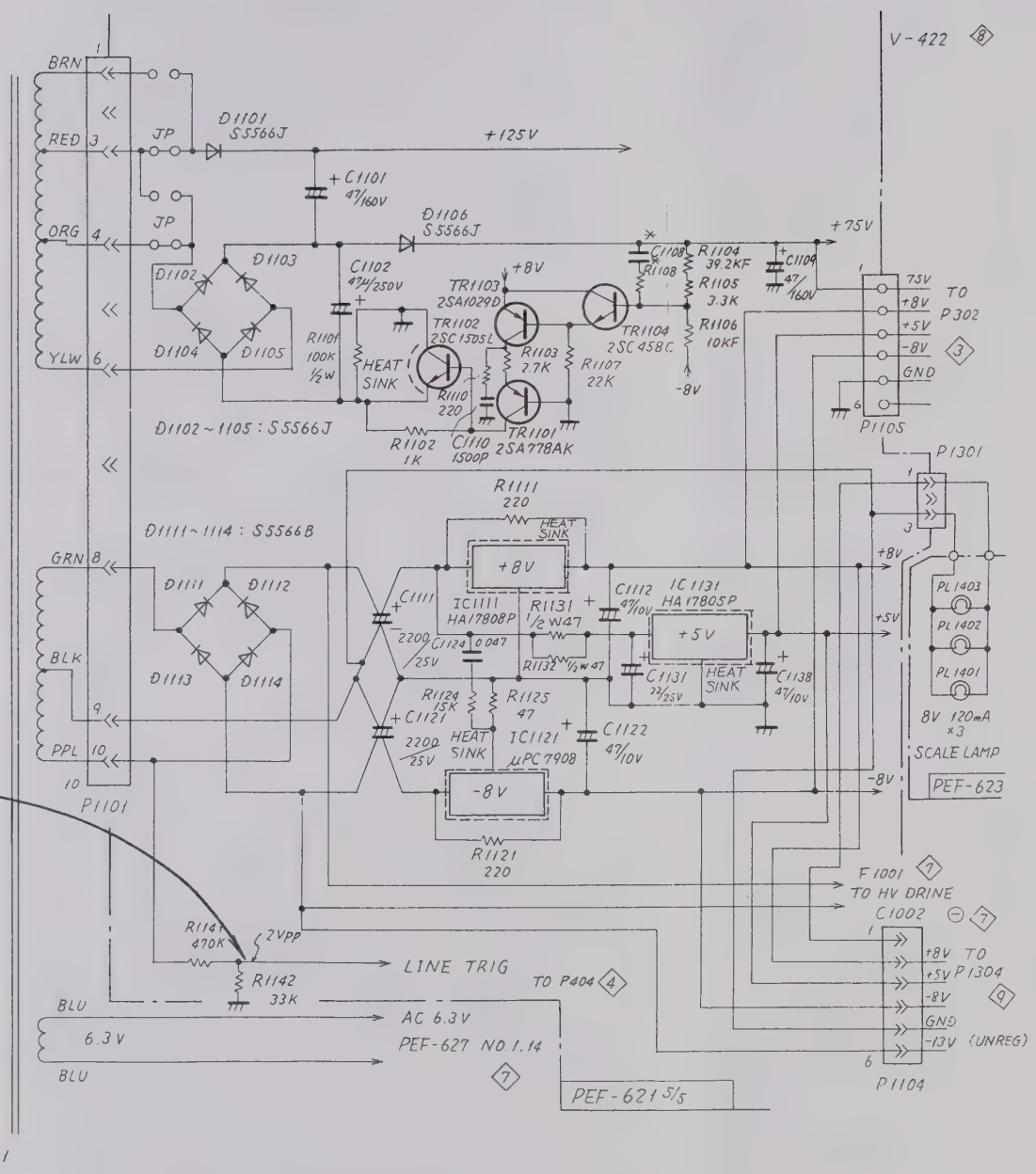
F1101

2A 100/120V

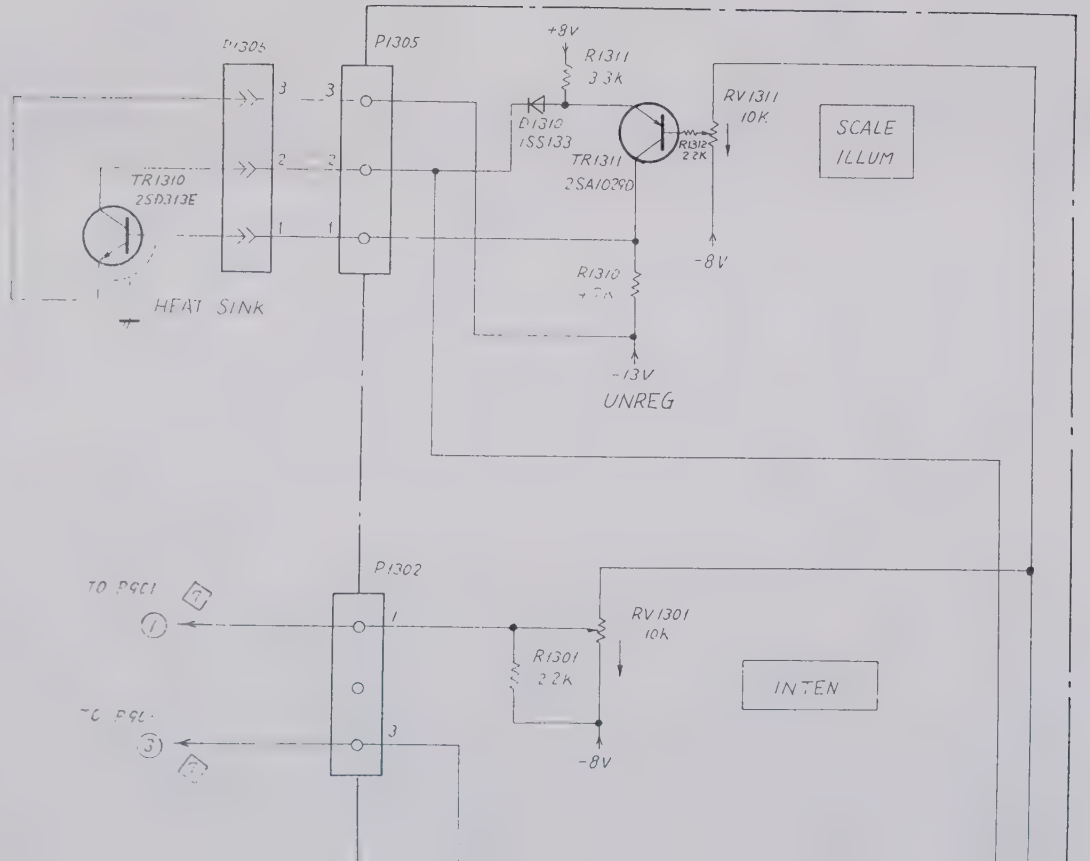
1A 220/240V





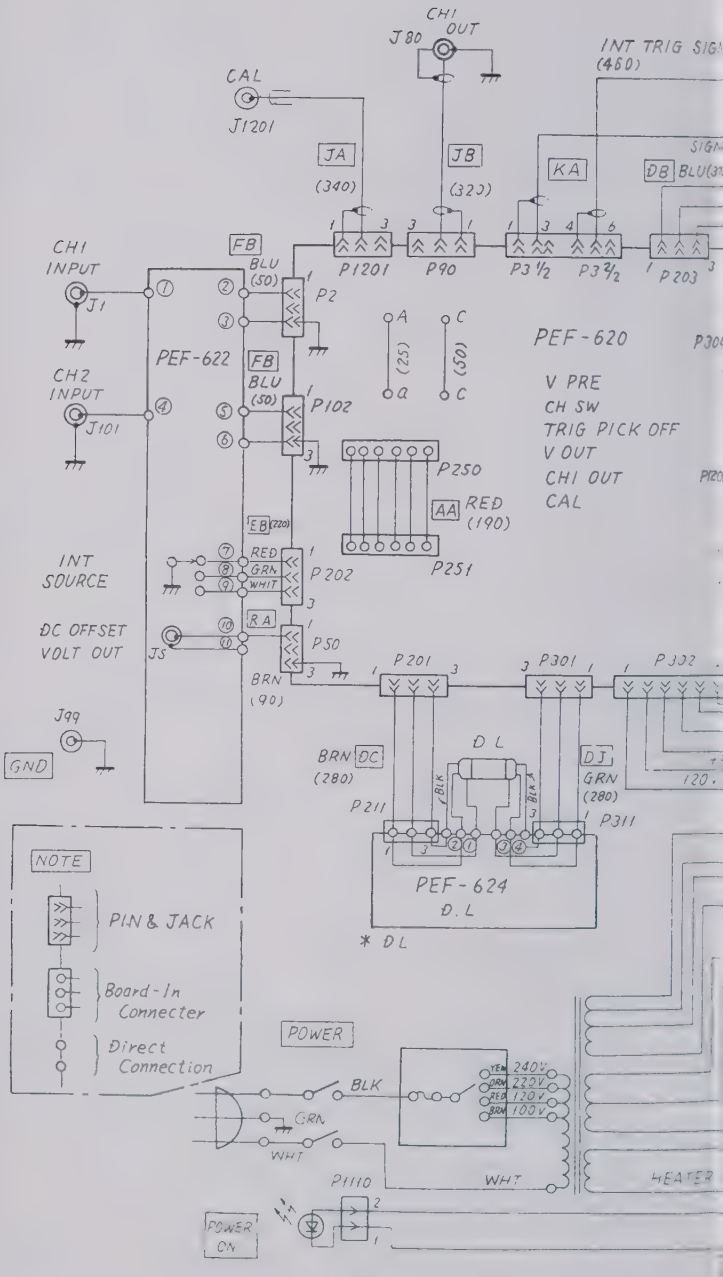


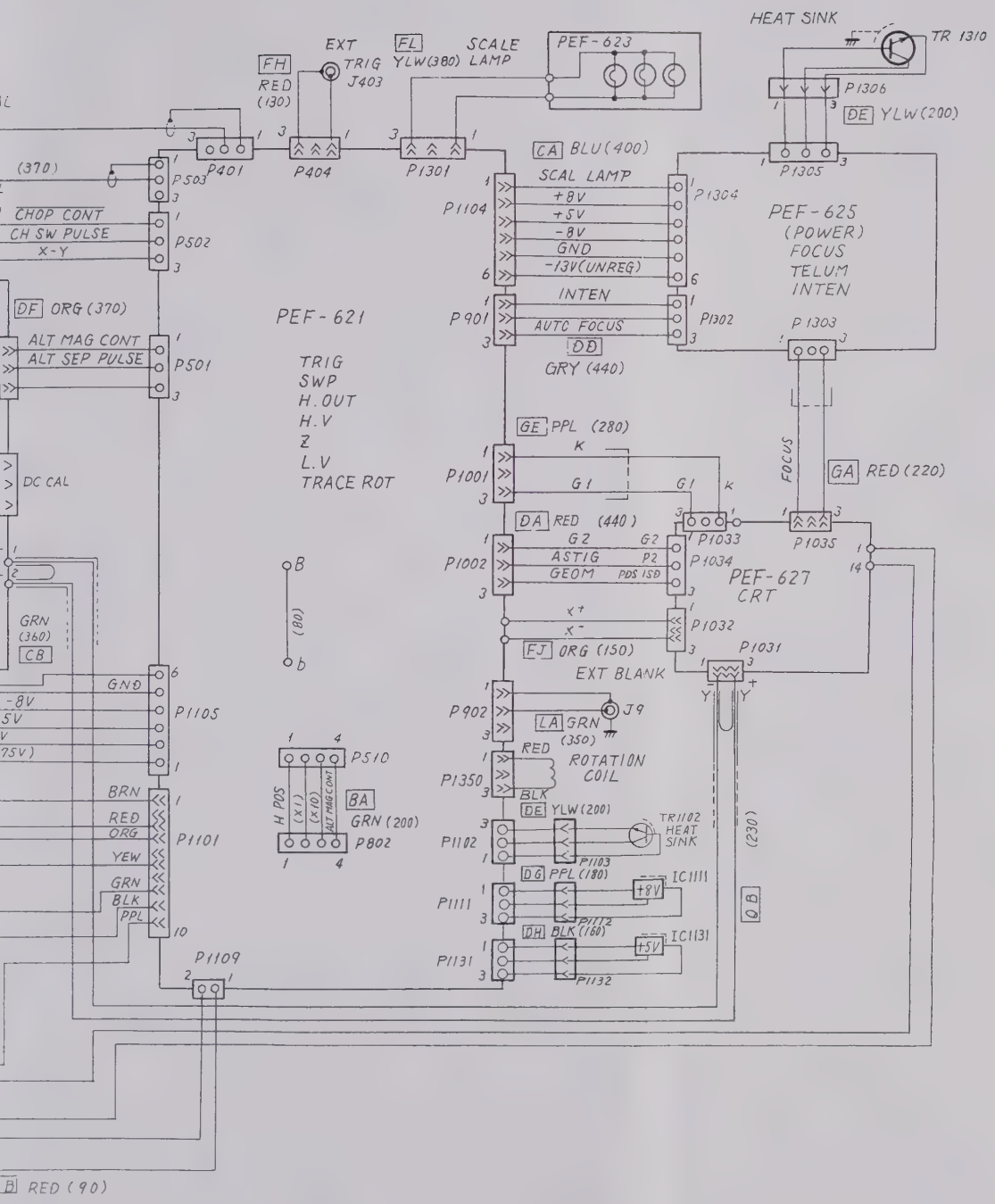
V-422
POWER SUPPLY ⑧


P1305
P1305
+8V
R1311
3.3K
RV1311
10K
SCALE
ILLUM
D1310
1SS133
TR1311
2SA1029O
R1312
22K
TR1310
2SD313E
-8V
R1310
HEAT SINK
-13V
UNREG
P1302
TO PCC1
RV1301
10K
R1301
22K
INTEN
-8V

V-422

RV/LAMP ⑨


CH1 OUT
J80
INT TRIG SIG
(460)
CAL
J1201
JA
(340)
JB
(320)
KA
DB BLU(3
P1201
P90
P3 1/2
P3 3/2
P 203
CH1 INPUT
J1
FB
BLU (50)
P2
PEF-622
CH2 INPUT
J101
P102
P250
AA RED (190)
P251
PEF-620
V PRE
CH SW
TRIG PICK OFF
V OUT
CH1 OUT
CAL
EB (220)
RED
GRN
WHIT
P202
INT SOURCE
DC OFFSET VOLT OUT
J3
RA
P50
BRN (90)
J99
GND
P201
P301
P302
BRN DC (280)
D L
DJ GRN (280)
P211
P311
BLK
PEF-624
D. L
* D L
NOTE
PIN & JACK
Board-In Connecter
Direct Connection
POWER
BLK
GRN
WHT
240V
220V
120V
100V
P1110
HEATER
POWER ON

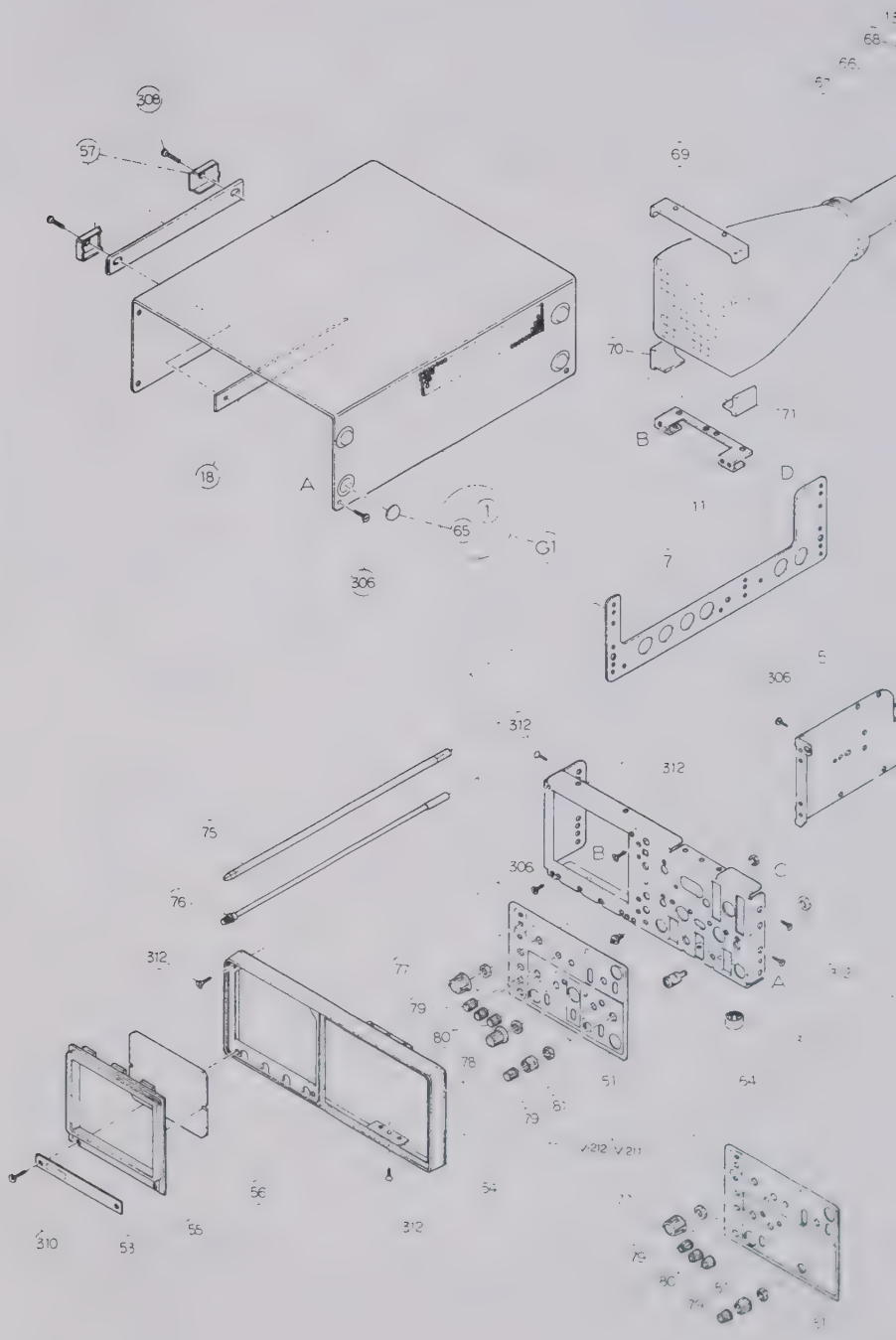


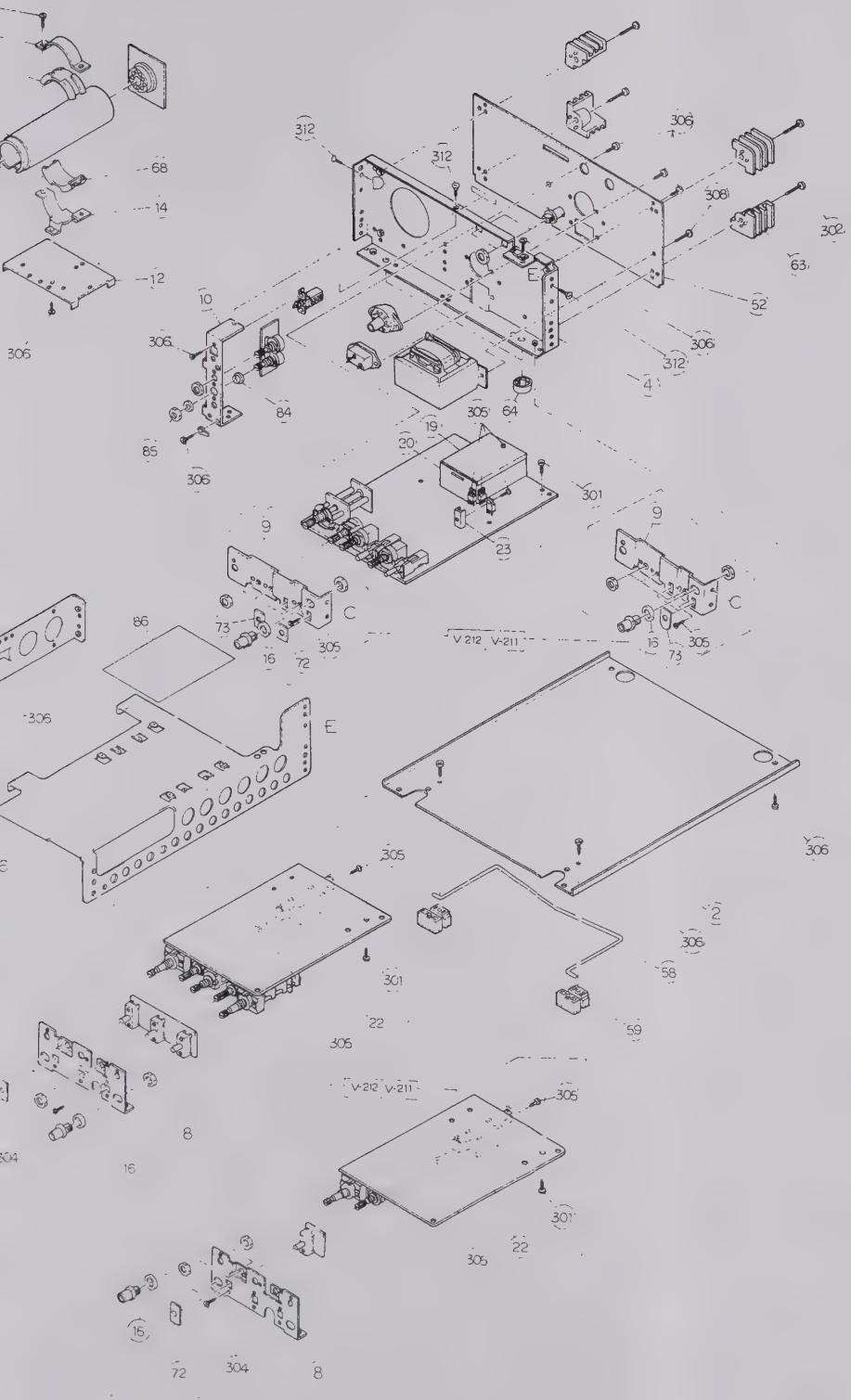
V-422
WIRING DIAGRAM

11. MECHANICAL PARTS LIST AND EXPLODED VIEW
V-211/V-212

Part Code	Symbol		Description	Qty V-211	Qty V-212
8403435A	G	1	COVER ASSY	1	1
3177955A		1	COVER	1	1
3177957A		2	COVER BOTTOM	1	1
2105416A		3	CHASSIS FRONT	1	1
2105417AA		4	CHASSIS REAR	1	1
2105418AA		5	CHASSIS C	1	1
2105419AA		6	CHASSIS P	1	1
3177958AA		7	CHASSIS L	1	1
3177959A		8	BRACKET	1	1
3177960A		9	BRACKET	1	1
8398471A		10	BRACKET	1	1
8398472A		11	BRACKET CRT	1	1
8398473A		12	BRACKET CRT	1	1
8398474A		13	CRT BAND	1	1
8398475A		14	CRT BAND	1	1
8398476A		15	NUT PLATE	2	2
8398477A		16	SPACER BNC	2	2
8399593A		18	PLATE	1	1
3180079A		19	SHIELD CASE HV	1	1
8400305A		20	SHIELD COVER HV	1	1
8405457-59A		22	HEAT SINK	2	2
8405460A		23	HEAT SINK	1	1
3179394A		51	PANEL FRONT	1	-
3179392A		51	PANEL FRONT	-	1
3179396A		52	PANEL REAR	1	1
8399592A		53	NAME PLATE	1	-
8399592B		53	NAME PLATE	-	1
121381A		54	FRONT MASK	1	1
2105423A		55	BEZEL	1	1
8395445A		56	FILTER	1	1
4053616A		57	HANDLE	1	1
8398478A		58	STAND	1	1
3175129A		59	STAND STOPPER	1	1
				1	1
3149317A		63	FOOT	4	4
3140755A		64	FOOT	4	4
8396865A		65	FOOT	4	4
8395432A		66	SHIELD BAND	1	1
8396867A		67	RUBBER PLATE	1	1
3144055A		68	RUBBER	2	2
8395443A		69	RUBBER	1	1
8395444A		70	RUBBER	1	1
8395444B		71	RUBBER	1	1
8396868A		72	SPACER	1	3
8396868B		73	SPACER	2	2
3180083AA		75	KNOB-PW	1	1
3180084AA		76	KNOB-L	2	2
3140804B		77	KNOB-S22	1	1
3149321B		78	KNOB-S18	-	1
3149324C		79	KNOB-S18B	2	3
3149324D		80	KNOB-S18B	3	4
3122681C		81	KNOB-0016	1	2
8393786A		83	LABEL	1	1
8401613A		84	INSULATOR	1	1
8401614A		85	INSULATOR	1	1
8401625A		86	PLATE INSULATOR	1	1
8383455B		87	SADDLE	6	6
XCA6061		301	SCREW SEMS 3 x 5	10	10
8340167C		302	SCREW SEMS 4 x 20	4	4
XCA6005		303	SCREW 2.6 x 5	2	1
XCA6306		305	SCREW 3 x 6	2	
XCA6308		306	SCREW x 8	32	32
XCA6316		307	SCREW 3 x 16	2	2

Part Code	Symbol		Description	Qty V-211	Qty V-212
XCA6412	G	308	SCREW 4 x 12	4	4
XCA1820		310	SCREW 3 x 10	2	2
XCA7306		312	SCREW FLAT 3 x 6	19	19


308
57
69
70
71
B
18
A
65
G1
306
D
11
7
5
306
312
312
75
B
306
C
76
312
77
79
80
78
51
54
A
79
81
V212 V211
56
54
312
310
53
55
312
51

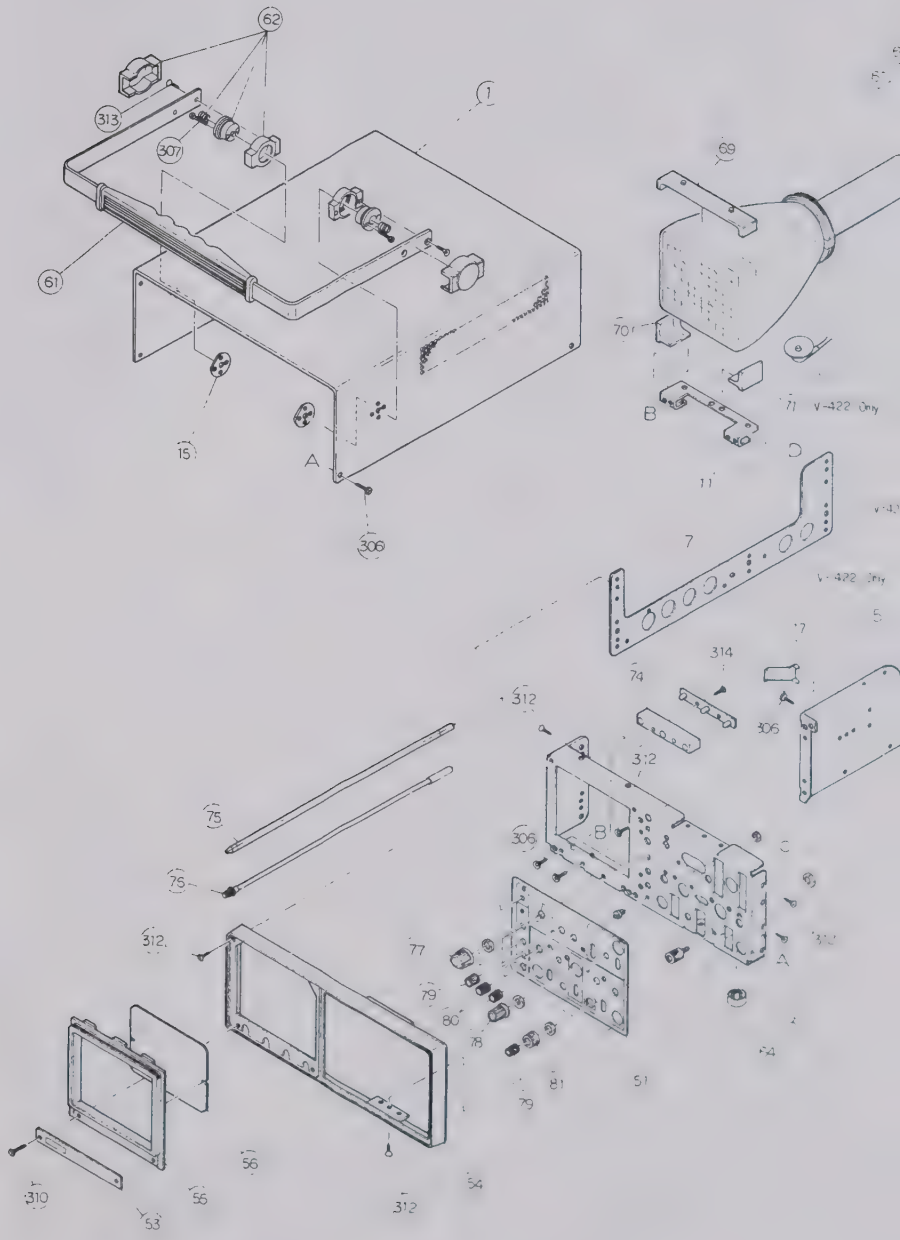


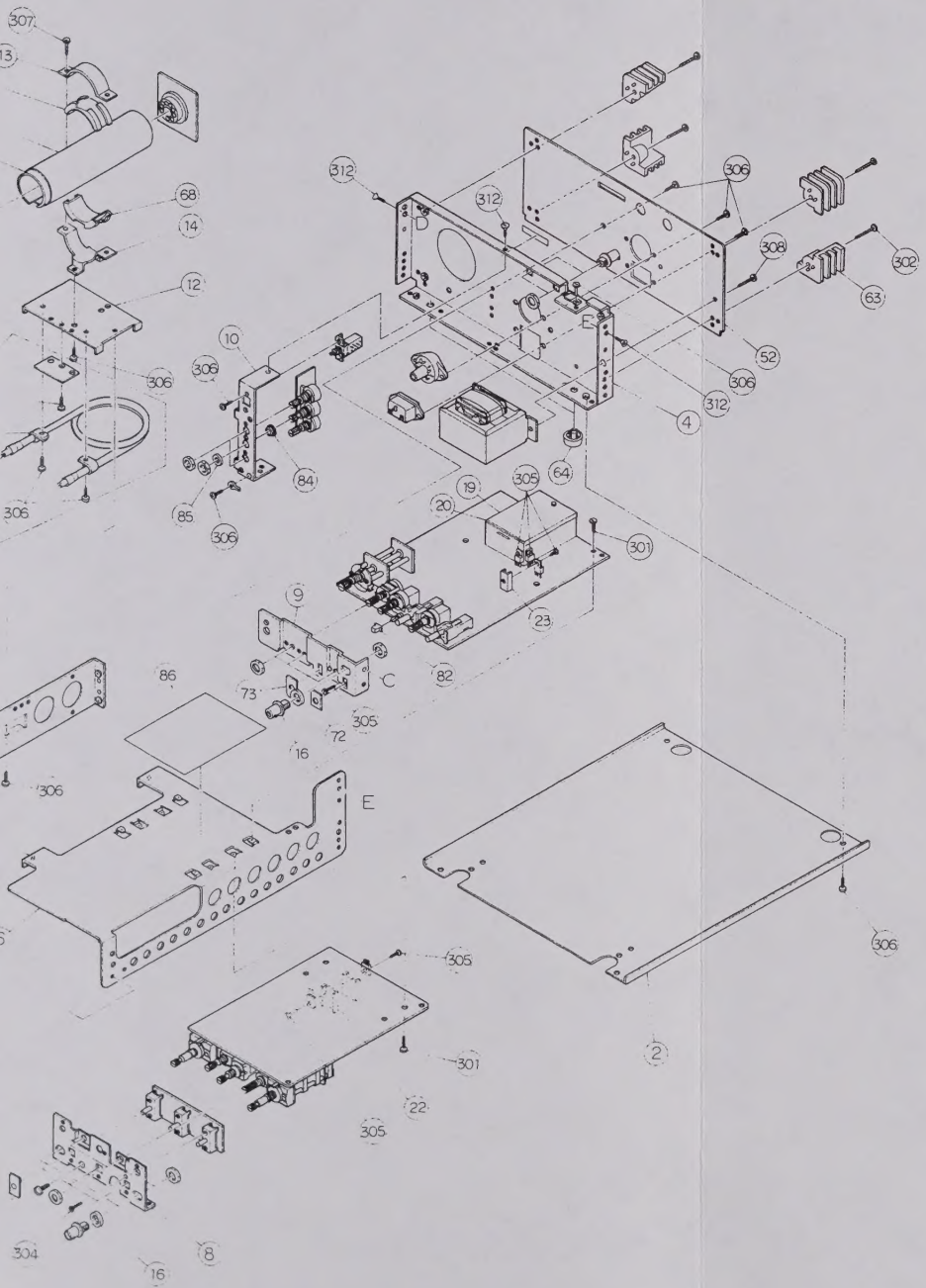
V-211/V-212
EXPLODED VIEW

V-222/V-422

Part Code	Symbol	Description	Qty V-422	Qty V-222
3177956A	1	COVER	1	1
3177957A	2	COVER BOTTOM	1	1
2105416A	3	CHASSIS FRONT	1	1
2105417AA	4	CHASSIS REAR	1	1
2105418AA	5	CHASSIS C	1	1
2105419AA	6	CHASSIS P	1	1
3177958AA	7	CHASSIS L	1	1
3177959A	8	BRACKET	1	1
3177960A	9	BRACKET	1	1
8398471A	10	BRACKET	1	1
8398472A	11	BRACKET CRT	1	1
8398473A	12	BRACKET CRT	1	1
8398474A	13	CRT BAND	1	1
8398475A	14	CRT BAND	1	1
8398476A	15	NUT PLATE	2	2
8398477A	16	SPACER BNC	3	3
8398479A	17	EARTH SPRING	1	-
3180079A	19	SHIELD CASE HV	1	1
8400305A	20	SHIELD COVER HV	1	1
8405457-59A	22	HEAT SINK	2	2
8405460A	23	HEAT SINK	1	1
3179392C	51	PANEL FRONT	1	-
3179392B	51	PANEL FRONT	-	1
3179396A	52	PANEL REAR	1	1
8399592D	53	NAME PLATE	1	-
8399592C	53	NAME PLATE	-	1
121381A	54	FRONT MASK	1	1
2105423A	55	BEZEL	1	1
8395445A	56	FILTER	1	1
3177922A	61	HANDLE	1	1
8377076A	62	HANDLE STOPPER	1	1
3149317A	63	FOOT	4	4
3140755A	64	FOOT	4	4
8395432B	66	SHIELD BAND	1	-
8395432A	66	SHIELD BAND	-	1
8396867B	67	RUBBER PLATE	1	-
8396967A	67	RUBBER PLATE	-	1
3144055A	68	RUBBER	2	2
8395443A	69	RUBBER	1	1
8395444A	70	RUBBER	1	1
8395444B	71	RUBBER	1	1
8396868A	72	SPACER	3	3
8396868B	73	SPACER	2	2
8395431A	74	PLATE LAMP GUIDE	1	1
3180083AA	75	KNOB-PW	1	1
3180084AA	76	KNOB-L	3	3
3140804B	77	KNOB-S22	1	1
3149321B	78	KNOB-S18	1	1
3149324C	79	KNOB-S18B	3	3
3149324D	80	KNOB-S18B	4	4
3122681C	81	KNOB-0016	2	2
8383451A	82	KNOB-SW	1	1
8393786A	83	LABEL	1	1
8401613A	84	INSULATOR	1	1
8401614A	85	INSULATOR	1	1
8401625A	86	PLATE INSULATOR	1	1
8383455B	87	SADDLE	7	5
8124535C	88	CLIP	4	-
XCA6616	301	SCREW SEMS 3 x 8	17	17
8310167C	302	SCREW SEMS 3 x 20	1	1
XCA6005	304	SCREW 3 x 5	1	1
XCA6306	305	SCREW 3 x 6	6	6
XCA6308	306	SCREW 3 x 8	28	25

Part Code	Symbol	Description	Qty V-422	Qty V-222
XCA6316	307	SCREW 3 x 16	6	6
XCA6412	308	SCREW 4 x 12	2	2
XCA1820	310	SCREW 3 x 10	2	2
XCA7306	312	SCREW FLAT 3 x 6	19	19
XCA7410	313	SCREW FLAT 4 x 10	4	4
XCA0251	314	SCREW PAN 3 x 8 PLASTIC	2	2


62
313
307
1
61
15
A
306
69
70
71 V-422 Only
B
11
7
V-422 Only
314
74
312
306
312
75
75
306
B
312
77
79
80
78
81
51
54
56
310
55
53
312



V-222/V-422
EXPLODED VIEW

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